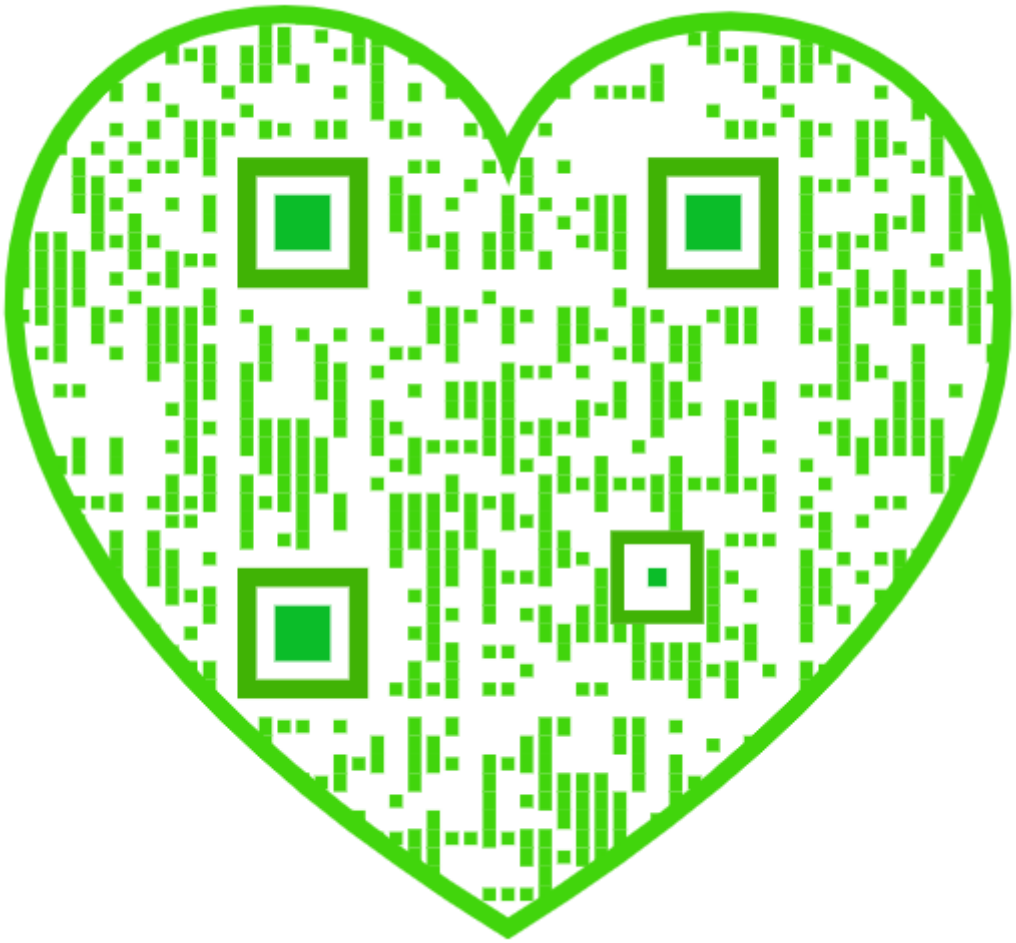

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KEY TO PRONUNCIATION.

ā	far, father
ă	fate, hate
a or ă	at, fat
ā	air, care
ą	ado, sofa
â	all, fall
ch	choose, church
ē	eel, we
e or ĕ	bed, end
ė	her, over: also Fr. *e*, as in *de; eu*, as in *neuf;* and *oeu*, as in *boeuf, coeur;* Ger. *ö* (or *oe*), as in *ökonomie.*
ę	befall, elope
ē	agent, trident
ff	off, trough
g	gas, get
gw	anguish, guava
ħ	hat, hot
h or H	Ger. *ch*, as in *nicht, wacht*
hw	what
ī	file, ice
i or ĭ	him, it
i	between e and i, mostly in Oriental final syllables, as, Ferid-ud-din
j	gem, genius
kw	quaint, quite
ṅ	Fr. nasal *m* or *n*, as in *embonpoint, Jean, temps*
ñ	Span. *ñ*, as in *cañon* (cän'yŏn), *piñon* (pēn'yŏn)
ng	mingle, singing
nk	bank, ink
ō	no, open
o or ŏ	not, on
ô	corn, nor
ȯ	atom, symbol
ọ	book, look
oi	oil, soil; also Ger. *eu*, as in *beuiel*
ō or oo	fool, rule
ou or ow	allow, bowsprit
s	satisfy, sauce
sh	show, sure
th	thick, thin
ṫh	father, thither
ū	mute, use
u or ŭ	but, us
u̇	pull, put
ü	between u and e, as in Fr. *sur*, Ger. *Müller*
v	of, very
y	(consonantal) yes, young
z	pleasant, rose
zh	azure, pleasure

' (prime), " (secondary) accents, to indicate syllabic stress

THE ENCYCLOPEDIA AMERICANA

Campos, Arsenio Martinez, är-sā'-nē-o mär-tē'nĕth kām'pōs, Spanish military officer: b. Segovia, Spain, 14 Dec. 1834; d. 3 Sept. 1900. He was graduated at the Military Staff School in Madrid and appointed a lieutenant in the army in 1858; served on the staff of Gen. O'Donnell and became chief of the battalion in the Morocco campaign of 1859; was on duty in Cuba with the rank of colonel in 1864–70; took part in suppressing the Carlist insurrection and was promoted brigadier-general in 1870; opposed the republic after the abdication of King Amadeus, and was imprisoned as a conspirator. Under a plea for permission to be allowed to serve as a private, he was released and given command of a division in the 3d Army Corps in 1874. In the next two years he was constantly fighting the Carlists, distinguishing himself at Las Munecas and Galdames and causing the noted siege of Bilboa to be raised. With Gen. Jovellar, he called Alphonso XII. to the throne; was made commander-in-chief of the Catalonia district, and crushed Don Carlos at Pena de la Plata in 1876. For these services he was promoted captain-general. In 1877 he was appointed commander-in-chief in Cuba, and brought the revolution to a close chiefly by means of concessions which, as minister of war and premier in 1879, he endeavored unavailingly to carry out. He was minister of war in 1881 and 1883, commander of the Army of the North of Spain in 1884–5, president of the Spanish senate in 1885; and captain-general of New Castile in 1888. In April 1895 he was appointed governor-general and commander-in-chief in Cuba, and in January 1896 he was recalled to Spain. He found the insurrection more formidable than he had anticipated, and his failure to pursue a vigorous war policy caused much dissatisfaction in Spain. On his arrival in Madrid he repeated his belief that the trouble in Cuba could only be ended by granting reforms.

Cam'pra, An'dra, French composer: b. Aix, Provence, 4 Dec. 1660; d. Versailles, 29 July 1774. He ranks among the most distinguished composers of operas, his themes being classical love stories, notably 'The Triumph of Love'; 'The Amours of Mars and Venus'; 'Hippodamia'; etc.

Campus, the name given in most colleges to the recreation ground more or less enclosed by the college buildings. At Harvard the space here indicated is known as the "yard."

Cam'pus Mar'tius (called also, by way of eminence, *Campus,* merely) was a large place in the suburbs of ancient Rome, consisting of the level ground between the Quirinal, Capitoline, and Pincian hills, and the river Tiber. From the earliest times it seems to have been sacred to the god Mars, from which circumstance it received its name. It was originally set apart for military exercises and contests, as also for the meetings of the comitia by tribes and by centuries. In the later period of the republic, and during the empire, it was a suburban pleasure-ground for the Romans, and was laid out with gardens, shady walks, baths, etc.

Cam'pus Scelera'tus, a name given to a spot within the walls of Rome, and close by the Porta Collina, where those of the vestal virgins who had transgressed their vows were entombed alive, from which circumstance it took its name.

Campvere', now **Veere, Vere,** or **Ter-Vere,** Holland, a maritime town in the province of Zeeland and the island of Walcheren, four miles north-northeast of Middelburg, on the Veerschegat, a sea-arm which separates Walcheren from the island of North Beveland. It is fortified, entered by four gates, has a harbor, a town-house, and a market-place, but its trade has greatly decreased. It is historically interesting as being a place where the Scotch had a separate community and various privileges. Pop. 9,000.

Camtoos', a river of Cape Colony, which falls into the sea west of Algoa Bay; length, 200 miles.

Camuccini, Vincenzo, vĭn-chĕnt-zo kā-moo-chē'nē, Italian historical painter: b. Rome, about 1775; d. 1844. He followed the pseudo-classical style, and his pictures are of large size. Among his best-known works are

'Death of Cæsar'; 'Death of Virginia'; 'The Incredulity of Thomas'; 'Horatius Cocles'; and 'Death of Mary Magdalene.' He also excelled in portraits.

Camus, Antoine de, ăn-twăn dė kă-mü, French physician: b. 1722; d. 1772. He became professor in the University of Paris in 1762; was noted for the original character of his technical publications and his literary ability, and was the author of a comedy, 'Love and Friendship'; a poem. 'The Medical Amphitheatre' (1745); 'Maladies of the Region of the Heart'; and 'The Medicine of the Mind' (1753).

Camus, Armand Gaston, ăr-măń găs-tŏń, French revolutionist: b. Paris, 2 April 1740; d. 2 Nov. 1804. A zealous and ascetic Jansenist, and a master of ecclesiastical law, he was elected advocate-general of the French clergy, and in 1789 member of the States-General by the people of Paris. He now appeared as the resolute foe of the ancient régime, gained possession of and published the so-called 'Red Book,' with its details of expenditures so disadvantageous to the court and its ministers. He was absent in Belgium during the king's trial, but sent his vote for death. He was made member, and afterward president, of the Council of Five Hundred, but resigned in May 1797, and devoted his time to literature.

Cam'wood, Barwood, or **Ringwood,** a red dye-wood (*Baphia nitida*) obtained in Brazil and also in Africa. It once was common in the neighborhood of Sierra Leone, and was also found in Tonquin and other parts of Asia. This wood is of a very fine color, and is principally used in turnery for making knife-handles and other similar articles. The dye, mordanted with alum and tartar, obtained from it is brilliant, but not permanent.

Ca'na of Galilee, a town in Palestine, at no great distance from Capernaum, remarkable chiefly as having been the scene of Christ's first miracle. It was there he turned water into wine (John ii. 1). It was also the city of Nathanael, and the place where Jesus was applied to by the nobleman from Capernaum on behalf of his dying son, and with a word effected the cure. A long-established tradition has identified it with a village bearing the name of Kefr Kenna, which lies about four miles northeast from Nazareth; but this has been disputed.

Canaan, kā'năn, the ancient name of the country west of the Jordan, called also Chanaan, and the Land of Canaan, after one of the sons of Ham. The Greeks applied the term Cana to the entire region between the Jordan and the Mediterranean up to Sidon, afterward termed by them Phœnicia, a name which by degrees came to be confined to the north coast district, or Phœnicia proper. Canaan is generally considered equivalent to the Land of Israel or Palestine. The term is so used in the Pentateuch, and in the early history of the Hebrews it was synonymous with the "Land of Promise." In certain passages in the Prophets the word seems to be restricted in meaning to the maritime plain of Palestine.

Ca'naanites, the general name for the heathen peoples (Jebusites, Hittites, Amorites, etc.) whom the Israelites found dwelling in Canaan (q.v.), west of the Jordan, and whom latterly they utterly subdued, though the subjugation was not quite complete till Solomon's time. They are believed to have been, in part at least, of kindred race with the Israelites; and some authorities find traces of their descendants among the present inhabitants of Palestine. The name Canaanites was also applied in a more restricted sense to one of these peoples.

Canace, kăn'ă sē. (1) In Greek mythology, a daughter of Æolus and Enarete, who was punished by death because of her unlawful passion for her brother; she is mentioned in Gower's 'Confessio Amantis,' and in Chaucer's 'Man of Law's Tale.' (2) In Chaucer's 'Squire's Tale' the daughter of King Cambuscan.

Can'ada, Dominion of, confederation of British provinces in North America, the largest of Great Britain's colonial possessions, comprising the provinces of Ontario, Quebec, Nova Scotia, New Brunswick, British Columbia, Prince Edward Island, and Manitoba, along with a vast region in the northwest known as the Northwest Territories, and certain other vast regions not as yet under a regularly organized system of government. The Dominion thus embraces the whole of British North America, with the exception of Newfoundland and part of Labrador (which belongs to Newfoundland), and its area is not much less than that of Europe. The following table shows the present areas of the provinces of the Dominion, with their populations in 1891 and 1901. The total population in 1871 was 3,686,013.

Provinces	Area in sq. miles	Pop. in 1891	Pop. in 1901
Ontario	222,000	2,112,989	2,167,978
Quebec	347,350	1,488,586	1,620,974
New Brunswick	27,700	321,294	331,093
Nova Scotia	20,550	450,523	459,116
Manitoba	73,956	154,442	246,464
British Columbia	383,000	92,767	190,000
Prince Edward Island	2,133	109,088	103,258
Northwest Territories, etc.	2,371,481	99,722	220,000
Dominion of Canada	3,448,170	4,829,411	5,338,883

Nova Scotia, New Brunswick, and Prince Edward Island are called the maritime provinces, though British Columbia is also a maritime province. In the Northwest Territories are four organized districts, Assiniboia, Saskatchewan, Alberta, and Athabasca. There are also the districts of Keewatin, Yukon, Mackenzie, Franklin, and Ungava. The boundaries are: the Atlantic on the east, the United States on the south, the Pacific and Alaska on the west, and the Arctic Ocean on the north.

Coasts.— On the east the coast-line is very irregular, being marked by deep indentations and fringed with islands. The province of Nova Scotia forms an odd peninsular projection with the Bay of Fundy between it and the mainland, while north of it is the Gulf of St. Lawrence, shut in from the Atlantic by Cape Breton and Newfoundland. In the gulf are the island of Anticosti and Prince Edward Island. The chief features of the north coast are the archipelago of the Arctic islands and the great opening of Hudson Bay, connected with the Atlantic by Hudson Strait, and having as its southern continuation James Bay. On the west coast are Vancouver Island, the Queen Charlotte Islands, and many others. The southern boundary is

most remarkable for passing through the system of Great Lakes — Superior, Huron, Erie, and Ontario, between the last two of which are Niagara Falls, partly belonging to Canada, partly to the United States. To the Atlantic the drainage of these lakes is carried by the St. Lawrence, with which river, and the great gulf into which it expands, are connected the provinces of Ontario, Quebec, New Brunswick, Nova Scotia, and Prince Edward Island, together containing by far the greater portion of the population of the Dominion.

Surface.— With regard to the character of the surface, Canada may be divided roughly into three great regions: a region of woodlands and hills or undulating ground in the east, an immense region of prairies in the middle, and a mountainous forest region in the west. The chief mountain ranges of the east are north and south of the St. Lawrence, and run nearly parallel to that river. On the south are the Shickshock Mountains and the Notre Dame Range, the former rising to the height of 4,000 feet. On the north is the Laurentian Range (perhaps attaining 4,000 feet), running in a westerly direction from the Labrador coast to the Ottawa River, and forming the watershed between the rivers which flow into the St. Lawrence and those which flow into Hudson Bay. The prairie region and great wheat-producing tract extends northwest of Lake Superior to the Rocky Mountains. This is a great region of plains, with low hills in some places; it is well wooded in many parts, elsewhere bare or with an agreeable mixture of woodland and prairie. Some portions are decidedly infertile, but their area is small compared with the whole. On the Pacific slope we have a distinctly mountainous region, including the Rockies, some peaks of which (Mt. Hooker, Mt. Brown) attain a height of about 16,000 feet, as also the Gold and the Cascade ranges. This region, with its high mountains, deep gorges or cañons, large and rapid rivers, long and narrow lakes, great forests of gigantic trees, and its narrow inlets, presents an aspect peculiar to itself.

Lakes and Rivers.— The vast lake and river systems which Canada possesses of its own, or shares with the United States, give it a unique character. Everywhere in the interior are rivers and lakes. To Hudson Bay flow the Albany, Nelson, Churchill, and many other streams; to the Arctic Ocean, the Mackenzie, Coppermine, and Back or Great Fish River; to the Pacific, the Fraser, Skeena, Stickeen, etc. The basin of the St. Lawrence, with the connected lakes, Superior, Huron, Michigan, Erie, and Ontario, affords a continuous waterway from the Atlantic to the interior of the continent. To this system belong the Ottawa, Gatineau, Richelieu, St. Maurice, Saguenay, and other rivers. In the prairie region and the northwest are similar great lake and river systems, formed by the Saskatchewan, Nelson, Churchill, Athabasca, and Mackenzie rivers, and the great lakes, Winnipeg, Athabasca, Great Slave, and Great Bear. The Saskatchewan, lying in the heart of the rich wheat-growing district, must in time prove a far more important waterway than at present. The Mackenzie and its connected lakes and rivers form the most remarkable feature of the far northwest. This river, including its tributary, the Peace, has a length of perhaps 2,500 miles, and drains an area of 550,000 square miles, or almost double that of the St. Lawrence basin. Between the Mackenzie system and Hudson Bay is a great region called from its desolate character the Barren Grounds.

Geology and Minerals.— As regards the geological features of Canada, a great part of the Dominion north of the St. Lawrence and west of Hudson Bay is covered with archæan rocks belonging to the Laurentian system, and consisting largely of granite and gneiss, with quartz-rock, schist, limestone, etc. South of the St. Lawrence, in New Brunswick and Nova Scotia, is a considerable development of carboniferous strata. Between the archæan rocks and the Rocky Mountains is a great area of secondary (Mesozoic) strata. In the Rocky Mountain region the archæan, palæozoic, mesozoic, and tertiary systems are represented. Canada has great mineral wealth. Iron of the best quality has been found in great abundance in Quebec, Ontario, and British Columbia. The district round Lake Superior and the upper part of Lake Huron abounds in copper, and has much silver as well; and Nova Scotia, Assiniboia, Alberta, and British Columbia are rich in coal. In Nova Scotia there are a number of coal-mines worked; gold is also obtained in some quantity, as well as iron. Coal is worked in the northwest, and more extensively in British Columbia, which is also rich in iron; but the most valuable mineral of the latter is gold. Much gold has latterly been obtained on the Klondike, near Alaska. Large quantities of petroleum are obtained. The chief oil district is the peninsula in the province of Ontario formed by Lake Erie and Lake Huron and the river St. Clair. Other useful mineral products are salt, gypsum, phosphate of lime, slates, asbestos, plumbago, antimony, and building-stone.

Animals.— The chief wild animals (some of them represented by several species) are the deer, buffalo, musk-ox, bear, wolf, fox, otter, beaver, squirrel, raccoon, muskrat, and marten. The buffalo is now scarce and will probably soon be exterminated. The largest of the deer kind is the moose, or elk, which is found in New Brunswick, Nova Scotia, and in northern parts of Quebec, as well as in the far west and northwest. The reindeer is found in the north. The grizzly bear is met with in the Rocky Mountains, and the polar bear in the extreme north and northeast. Fur-bearing animals are so numerous as to have been a source of revenue to a large trading company like the Hudson Bay Company for over two centuries. There are birds in great variety, Canada having more than 700 of these in all. They include the wild swan, wild turkey, geese and ducks of various kinds, partridges, quail, prairie-fowl, pigeon, woodcock, snipe, plover, etc.; besides eagles, hawks, owls, and many smaller birds, among which are two species of humming-bird. Except at certain seasons, game of all kinds may be shot at will. The rattlesnake and other snakes occur, but are less common than in the United States. The seas, lakes, and rivers, especially the Gulf of St. Lawrence and the neighboring waters, abound in almost all kinds of fish, and the fisheries are extremely valuable, employing over 250,000 people. The chief sea-fish caught include cod, herring, mackerel, halibut, haddock, hake, shad, and salmon. The rivers and lakes abound with salmon, whitefish, bass, trout, sturgeon, pike, pickerel, and other fishes. The seal and whale fisheries

are also valuable. Lobsters and oysters are abundant and excellent.

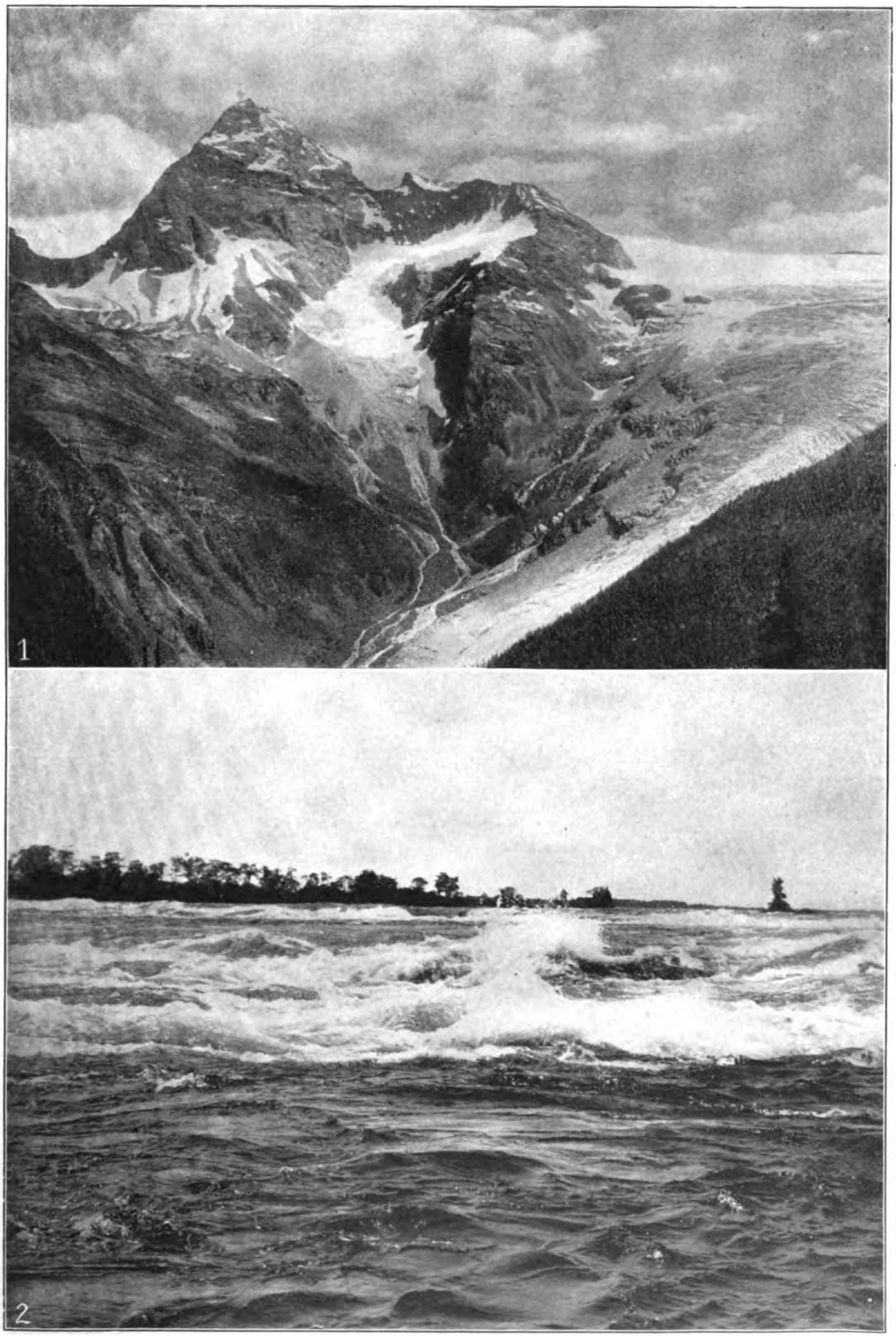
Vegetation.— The forests are of great extent, and the timber trade is a great source of wealth, the value of the timber and forest products shipped to Great Britain being annually over $20,000,000. In the forests grow more than 60 kinds of trees. Among the most valuable are the white and red pine, white and black spruce, maple, ash, beech, oak, walnut, butternut, chestnut, basswood, birch, and cedar. Over most of the Dominion (except in the prairie regions of the interior) good timber is found, though in the older and more closely settled parts the forests have been largely cleared off. The forests of British Columbia produce the largest timber, the Douglas pine being the chief tree. The balsam poplar grows to an immense size on the Athabasca, Peace, and Mackenzie rivers, and even at the mouth of the last, within the Arctic Circle, trees of some size are found. The Banksian pine grows to the height of 100 feet on the southern shores of Hudson Bay; and spruce suitable for building purposes, and the tamarac or larch, extend as far north as Fort George on its east and Fort Churchill on its west shore. The sugar-maple, a forest tree attaining the height of 120 feet, flourishes in the greater part of the St. Lawrence valley up to lat. 49°, and is much valued for the sugar that is obtained from it. There are a great many varieties of wild fruits, as the wild plum, wild cherry, raspberry, serviceberry, cranberry, gooseberry, strawberry, black and red currant, wild vine, blueberry, buffaloberry, etc., and numerous wild flowers and flowering shrubs. Of the wild fruits, the raspberry, the cranberry, and the blueberry are important economically. There are rich pasture grasses, but they cannot be utilized in cultivation.

Climate.— The climate of a country of such vast extent and varied features as Canada naturally differs very much in different places, and in this respect British Columbia on the Pacific coast, and Nova Scotia and the other Atlantic regions, are very dissimilar to the prairie region of the centre. So different, indeed, is the climate of one portion of the Dominion from that of other portions that Canada has been said to present "climates and productions similar to those of northwest and central Europe — that is, of Russia, Norway, the British Islands, Denmark, Germany, France, Holland, Belgium, Switzerland, and Northern Italy." In Ontario and the region of the Upper St. Lawrence it may be described as temperate, although the heat in summer and the cold in winter are on the average 20 degrees greater than in the corresponding seasons in Great Britain. Generally the climate of the Dominion shows considerable extremes of heat and cold, but except in some of the coast regions the exceeding dryness of the Canadian atmosphere makes both extremes of temperature more pleasant and healthful than similar temperatures in Great Britain. Apart from the portions of the Dominion that fall within the Arctic Circle, Labrador, and all the country east of Hudson Bay have the most severe climate. The Pacific coast region has a decidedly moist climate. The peninsula lying between Lake Ontario, Lake Erie, and Lake Huron has the finest climate, in which fruits, shrubs, and flowers may be grown that cannot stand the winter elsewhere. The Mackenzie River district — especially in the region of the Peace River, where the temperature throughout the year is remarkably genial — possesses a climate much less severe than one might expect, and suitable for agriculture almost to the Arctic Ocean.

Agriculture.— Both by soil and climate Canada is specially adapted for agriculture. Within the last few years its agricultural importance has greatly increased, and when the great prairies are brought under cultivation Canada will be one of the chief agricultural countries in the world. In general, sowing is later than in the northern parts of Great Britain, but the harvest is gathered earlier, a large part of it usually before the end of July, so rapid is the growth during the hot Canadian summer. The chief crops are wheat, barley, oats, rye, peas, maize, buckwheat, potatoes, turnips, mangel-wurzel, etc. The breeds of cattle are now being much improved partly by the introduction of high-class cattle from Great Britain; and cattle, horses, and sheep are exported. The value of exports connected with agriculture, including grain, flour, animals, and animal products (as cheese, eggs, etc.), is more than $75,000,000 annually. The province of Ontario has an agricultural college and model farm at Guelph, and there are also model farms in Quebec. Fruit-growing is an important industry in certain localities, and large quantities of apples are exported, as well as canned and dried fruits. Peaches are grown to most advantage in the Niagara district of Ontario, where peach orchards many acres in extent are to be seen. The vine is also cultivated, and good wine is made. Pears, plums, and many kinds of berry fruits are produced in great perfection.

Commerce.— The trade of the Dominion is chiefly with the United States and Great Britain. About four fifths of the exports are sent to these two countries, while nearly nine tenths of the imports come from them. Besides timber, animals and their produce, and agricultural products, the chief articles of export are fish, coal, and other minerals, leather, and wooden goods. The total exports in 1900 were valued at $170,600,000; the imports at $180,800,000. The imports chiefly consist of manufactured goods, coal, iron, tea, coffee, sugar, cotton, etc. A uniform decimal system of coinage was established throughout the Dominion in 1871. The unit of account is the dollar of 100 cents, the value of which is declared to be on the basis of 486 cents and two thirds of a cent to the pound of British sterling money. The money used consists of bank-bills, and gold, silver, and bronze coins, besides government notes of small denominations up to four dollars, the bank-bills being not of lower denominations than five dollars. There is a uniform system of weights and measures, the Canadian standards being the same as the British imperial standards. The British hundredweight of 112 pounds and ton of 2,240 pounds are, however, superseded by the United States weights of 100 pounds and 2,000 pounds respectively.

Railroads.— The inland trade of Canada has been much improved by the completion of the various lines of railroad, and is also greatly furthered by the extensive system of canals. Of the railroads the greatest is the Canadian Pacific, running from Montreal across the whole continent to Vancouver on the Pacific coast in British Columbia; length, about 2,900 miles, exclusive



1. Mount Sir Donald, and the Illecillewat Glacier, Selkirk Mountains.
2. Lachine Rapids, St. Lawrence River.

Mau

of branches. (See CANADIAN PACIFIC RAILWAY.) The Grand Trunk, which crosses the St. Lawrence at Montreal by the stupendous Victoria Bridge, connects the maritime provinces and the northeastern United States with the Western railroads. Other important railroads are the Intercolonial from Halifax, Nova Scotia, to Quebec, Montreal, etc.; and the Canada Atlantic line, giving a very direct route between the seaboard and the Great Lakes. The Dominion has now about 18,000 miles of railroad.

Canals.— Some of the canals are vast achievements. The most important, from a commercial point of view, are the St. Lawrence canals and the Welland Canal. The former series of canals, with an aggregate length of about 70 miles, avoids the rapids on the St. Lawrence between Montreal and Kingston on Lake Ontario, and thus affords to vessels the means of ascending to that lake (in descending vessels of 700 tons can shoot the rapids with safety); and the latter, which has a length of 27 miles, avoids the Niagara Falls and rapids, and enables vessels to ascend from Lake Ontario to Lake Erie. Both the Welland Canal and the St. Lawrence series have been enlarged and deepened, so as to accommodate the increased traffic expected as a result of the settlement of the northwestern provinces, and the construction of the Canadian Pacific line. The last Canadian canal necessary to complete the navigation of the St. Lawrence to Lake Superior is St. Mary's Canal, opened in 1895 at a cost of $3,750,000, avoiding the rapids in St. Mary's River, by which Lake Superior pours its waters into Lake Huron. Next after those mentioned, the most important of the Canadian canals is the series of locks and short artificial connections known as the Rideau Canal. It connects Lake Ontario at Kingston with the Ottawa near the city of that name. By means of these works large vessels can now sail by the St. Lawrence route from the Atlantic to the head of Lake Superior.

Constitution and Government.— By the Act of Confederation of 1867 the Constitution of the Dominion was required to be similar in principle to that of the United Kingdom. There is a central federal government with separate provincial governments and legislatures. The central executive government is vested in the sovereign of Great Britain and Ireland, and is carried on in his name by a governor-general appointed by the Crown, and a privy council. The governor-general has a salary amounting to $50,000 per annum. He is assisted by a privy council consisting of the prime minister and 12 other ministers or heads of departments. The legislative authority rests with a Parliament consisting of two houses, the Senate and the House of Commons. The Senate now consists of 80 members, who are nominated by the governor-general. Each senator must be a born or naturalized subject, 30 years of age, and possessed of real or personal property to the value of at least $4,000 in the province for which he is appointed. There are 24 senators from the province of Ontario, 24 from Quebec, 10 from Nova Scotia, 10 from New Brunswick, 4 from Manitoba, 4 from Prince Edward Island, 3 from British Columbia, and 2 from the territories. The House of Commons is elected by the people for five years. There is a uniform franchise, a vote being given to every male of 21, possessed of a small property qualification. Each of the provinces has a separate Parliament and administration, independent in its own sphere, at the head being a lieutenant-governor appointed by the central government. Ontario, Manitoba, and British Columbia have only one chamber; the other provinces have two. There is a very perfect system of municipal government throughout the Dominion, the counties and townships having local governments or councils which regulate their local taxation. The administration of justice is based on the English model, except in the province of Quebec, where the old French law prevails. The only court that has jurisdiction throughout the Dominion (except the exchequer and the maritime court) is the supreme court, the ultimate court of appeal in civil and criminal cases. In certain cases an appeal may be had to his Majesty's privy council. The capital of the Dominion is Ottawa, but the largest cities are Montreal, Toronto, and Quebec. The Dominion revenue and expenditure are over $40,000,000 annually; the debt is about $265,000,000. Canada has both a large volunteer force and a militia. The former comprises many well-equipped organizations in infantry, cavalry, and artillery. A military college for the training of officers is maintained by the Dominion government at Kingston.

Religion and Education.— There is no state church in the Dominion. The prevailing religion in Quebec is that of the Roman Catholic Church. In Ontario Methodists predominate, then Presbyterians, the English Church, and the Roman Catholics. Education is well attended to, being everywhere more or less under the supervision of government, and excellent free schools being provided. In Ontario, Quebec, and the northwest separate schools are provided for Roman Catholics; in the other provinces the schools are unsectarian. All the provinces except British Columbia have universities or colleges, and the provision made for higher education in general is exceptionally good, a fact which is said to have an observable influence on the tone of the periodical press.

People.— The population is increasing rapidly both naturally and by means of immigration. The nationality of the inhabitants is varied. Ontario is settled principally by emigrants from Great Britain and their descendants, with considerable numbers of Germans and Americans. In the province of Quebec the people are mostly French in origin, speech, and customs, being mainly descendants of the French colonists who inhabited the region before it became British. There are, besides, the Indian tribes and the Esquimaux, the latter in the extreme north. The Indians are estimated to number about 125,000. They are divided into various tribes as well as larger stocks or races, such as the Tinneh or Athabascan Indians, the Thlinkets and Hydahs of British Columbia and the west coast, the Algonquins, Hurons, Iroquois, etc., of the St. Lawrence region. In the old provinces separate land allotments have been granted to the Indian population, and there the Indians have adopted a settled mode of life, and have made considerable advances in civilization. A separate department of the Canadian government exercises a general supervision over their affairs. Schools have been established among them, and they are said to learn to read and write quickly and to show some talent for music and drawing.

The majority of the Indians, however, live beyond the influences of this kind of civilization, and wander over the plains of the northwest, supporting themselves by fishing and hunting, carrying their furs to forts or trading stations. There are also many half-breeds of mingled white (especially French) and Indian blood. These are intelligent and industrious, and engage in agriculture and other occupations, and usually speak a sort of corrupt French patois.

History.— English ships were the first to reach the shores of what is now Canada. In 1497 John Cabot, sailing from Bristol, landed on the coast of Labrador, and planted the English flag there. But it was the French navigator Jacques Cartier who, in 1534, first really opened up Canada for European settlers. Some years later he landed with 200 colonists, but after struggling for two winters they were compelled to return. For the next 50 years no further attempts were made in these regions, except that on the part of the English, Martin Frobisher in 1576, and Sir Humphrey Gilbert in 1583, explored and took formal possession of Newfoundland and the adjacent coasts; while in 1603 Samuel Champlain, a French naval officer, made a settlement at Port Royal in Acadia (New Brunswick and Nova Scotia), which was soon afterward abandoned. At length, in 1608, a French colony under the leadership of Champlain and Des Monts settled at Quebec. Two years later another English navigator, Henry Hudson, explored the river and the bay which bear his name. In 1627, Cardinal Richelieu organized the company of the Hundred Associates for the further colonization of New France. The most formidable foes of the colonists, whose number in 1663 was still under 2,000, were the Iroquois Indians, who swarmed round the settlements. In 1663, Colbert being at the head of affairs in France, fresh supplies of emigrants and a strong body of troops were sent out to Canada. The Iroquois found it advisable to make peace, and the soldiers, turning colonists, received grants of land. In 1682, however, a new war with the Iroquois broke out, in which the colonists, at first successful, latterly suffered severely in the massacre of Lachine.

The French colonists had scarcely recovered from this blow when war broke out between France and England. The French struck the first blow by the burning of the British settlement at Corlaer (now Schenectady), and the massacre of its inhabitants. The British colonists retaliated; but the Peace of Ryswick put an end to the war. In 1702 a new conflict arose, terminating in 1713 with the Peace of Utrecht, by which the British obtained Acadia, Newfoundland, and the regions around Hudson Bay, France retaining Canada, Cape Breton, etc. In the 30 years of peace which followed the French did not altogether neglect industrial development, but in general their colonists lacked the qualifications for agricultural and other settled pursuits. The British colonists, on the other hand, held to agriculture, and reclaimed every year great tracts of forest land. As a natural consequence their population rapidly increased, and when the final struggle began, the British colonies in America numbered 3,000,000 inhabitants against some 60,000 French colonists. In 1754 the French governor, Duquesne, an energetic and aggressive man, established new military posts in the Ohio valley, and seized a newly built British stockade on the spot where Pittsburg now stands. As the result of this action both sides prepared for war. The English government sent out two regiments under Gen. Braddock, who allowed himself to be surprised and routed near Monongahela; but an expedition against Crown Point under the leadership of Gen. William Johnson drove the French within their intrenched camp at Ticonderoga. Now happened the incident of the expulsion of the Acadian peasants (immortalized in Longfellow's 'Evangeline'), of whom about 7,000 still remained in Nova Scotia, mostly on the shores of the Bay of Fundy. They refused to swear allegiance to the British government, and some of them took part in the Indian raids against the British settlements. On these grounds the council at Halifax resolved upon the expulsion of the whole French population, and the measure was thoroughly carried into effect. The war in America was but a portion of the great conflict in which Great Britain was now engaged against France — the Seven Years' war, 1756–63. The early part of the struggle was decidedly in favor of the French, but with the appointment of Pitt as colleague of Newcastle and virtual prime minister in 1758, the face of affairs changed. Reinforcements under Wolfe, Howe, and Amherst were despatched, and after a determined resistance the struggle terminated in the final defeat of the French (1760) and the capitulation of Montreal.

Canada was now formally annexed to the British empire, and in 1774 an act passed in the British Parliament (the Quebec Act) extended the bounds of the province from Labrador to the Mississippi and from the Ohio to the watershed of Hudson Bay. In 1775 the American Revolution broke out, and Canada became the scene of a brief struggle between the royalists and the revolted colonists of New England. The war ended with the recognition of the independence of the American colonies by the Treaty of Versailles, 3 Sept. 1783, which detached from Canada the region between the Mississippi and the Ohio. On the other hand, thousands of American loyalists sought new homes in Canada. In 1791 Canada was divided into two provinces — Upper Canada or Ontario, and Lower Canada or Quebec — the latter still retaining its seigneurial tenure and French law in civil cases. In Upper Canada British law and freehold tenure were introduced. In both Upper and Lower Canada representative institutions, although not responsible government, were established. From 1812 to 1815, war having broken out between Great Britain and America, Canada was against the theatre of a bloody strife, among the chief incidents of which were Brock's victory over the Americans on the heights of Queenstown, and the battles of Chippewa, Lundy's Lane, Moravian's Town, etc. In 1837–8 the discontent of the people of Canada with their system of irresponsible government took the form of a rebellion, which was repressed after a brief struggle. The Earl of Durham was sent out as governor-general to settle affairs on a just and liberal basis, and made a report on the condition of Canada, which is one of the historical monuments of the country. The result of the rebellion and this report was the reunion in 1841 of Upper and Lower Canada as one province with equal rep-

resentation in the common legislature, and the practical concession on the part of the mother country of responsible government. Kingston was selected as the new seat of government, and three years afterward Montreal. In 1854 the Reciprocity Treaty with America was concluded, according to which there was to be free exchange of the products of sea and land, with navigation of the St. Lawrence, etc. In 1858 Ottawa was finally selected as the capital of Canada, the choice having been referred to the queen. Under the old Constitution the provinces of Upper and Lower Canada had equal representation in the legislature, but a demand arose on the part of the Upper Canadians for representation by population. This demand was practically conceded in a scheme of federation of the British North American colonies approved of by the Canadian Parliament at Quebec in 1865, and forwarded to the imperial government for approbation. In 1866 the Reciprocity Treaty with the United States having expired, it was not renewed until 1871, when an arrangement for 12 years was signed. In 1866 a Fenian movement against Canada originated in the United States, but the prompt mustering of Canadian volunteers made the filibusters recross the frontier in some haste, to be ultimately disarmed and dispersed by United States troops.

In 1867 (28 March) the British North America act for confederation of the colonies passed the Imperial Parliament. It united Upper Canada or Ontario, Lower Canada or Quebec, New Brunswick, and Nova Scotia into one territory, to be named the Dominion of Canada. Newfoundland declared against joining the confederation, but with that exception all the British territory north of the United States was gradually included within the Dominion — the Hudson Bay Company territory by purchase in 1868, British Columbia in 1871, Prince Edward Island in 1873. In 1870 an insurrection of the Red River settlers, who were under apprehensions as to how their titles to their lands might be affected by the cession of the Hudson Bay Company's rights, took place under the leadership of Louis Riel, and had to be suppressed by a military expedition under Col. (now Viscount) Wolseley. In 1884 the half-breeds and Indians of the Saskatchewan and Assiniboine districts rebelled against the government, but the movement was suppressed in a few months by Gen. Middleton and his volunteer forces, the leader, Louis Riel, being executed at Regina in 1885. On 7 November of the same year the Canadian Pacific R.R. was completed. Since 1883, when the Washington Treaty expired, disputes between the American and Canadian fishermen have been frequent. A joint British and American commission, instituted in 1887, failed to arrive at a final settlement. The seal-fishing in Bering Sea and the Alaskan boundaries question have also caused friction with the United States. In 1898 an Anglo-American commission was appointed to adjust all controversial matters between the two countries, but has not been successful in bringing about a final settlement.

Canada and the Empire. The British empire is no longer a geographical expression. It lives and moves and has being. Men doubted, and now they doubt no longer. For the first time in all history a parent state has seen her sons, who, successful builders of new states, throw themselves of their own free will into her quarrel, making it their own. They have watched how in one of the colonies foreign influence has been working against the welfare of a community like their own. They have deliberately judged from their own experience that it is not good for that colony or for themselves as constituent parts of the empire that the great experiment of nation-building should be marred or destroyed in south Africa. They have known among themselves how unsound is the theory or sentiment that racial differences should be crystallized into effective national governments.

Free institutions are the solvents of racial eccentricities, of seclusion, of partial privileges, and unwholesome ambitions. They have proved, by union among themselves, that new nations can grow only where tolerance and a power of adoption and the reception of new ideas coexist. They have in some instances come through trials of great severity before they found this truth. The blessings they have derived from their knowledge they have determined shall be gained in south Africa. Even if their ministers had for a while held back, doubtful as many cautious statesmen are of entering upon a great experiment before knowing the mind of their constituents, they could not hesitate except for a moment. The will of their peoples was instantly declared with a determination which no popular government could have resisted, even if they had been, as they were not, desirous to do so. From New Zealand, from Australia, from Canada, came the message, uttered as with one voice: "In the danger menacing Great Britain's empire through the peril affecting a great colony, we are with the motherland, and with the loyalists in that colony. We will aid in removing the evil. We will confirm the action of the parent state, we are at her side and our blood shall seal with hers the young liberties of the country we hope to see, with ourselves, a free dominion under our queen."

Never was there conflict more grand in its immediate result. Whatever the future may give, however blighted may be the hopes of this hour, the grandeur of the desire to spread constitutional liberty as forthshown by the colonies can never be darkened. The fairest hopes of nations as of men may miscarry, but it will ever be an encouragement to trust in the world's progress; that loyalty to freedom and advancement has been the empire's watchword in the closing year of the past century.

"Loyalty to freedom"— yes. That is the loyalty to Canada. She is the oldest of those peoples who have wrought for order and liberty among themselves, and have won by their own work what they have sought. It is because the British government has left them free to build up their new nation, that they have fought for another kindred nation's birth. This loyalty is allegiance to no government that does not stand as the champion of what they know to be liberty. They have not looked in vain to their old "home" for such championship. They have carried to their new lands the forms of procedure and legislation of law which they had at "home." They are no fugitives from any rule; they are the apostles of the authority they knew and loved. This can be said of no other emigrants

of any land or time. Others have fled from laws they found distasteful or oppressive, and have therefore not carried with them as household gods the institutions they were glad or content to leave behind them.

It has been otherwise with us. New York and New Scotland, and New South Wales, did not want to have a renovated set of institutions, but desired the old to flourish in the new soils christened by the ancient names. Constitutional liberty was to flourish on lands where a wide area could be attained for desires common to those who stayed and those who went. The faults of the 18th century were as dead as Julius Cæsar. The colonies had become strong enough to prove that they required no leading strings. They were strong enough to know they could give good value for the naval and military aid this grand old country had been ever ready to accord to them. They saw that she would be hard put to it, should the jealousy of foreign powers tempt them to assist an attempt to bring under a strange flag a great part of a sister colony's territory.

They disliked the conceit and racial inclusiveness which made the secessionists of Dutch descent attempt to set up and maintain a separate nationality, holding British law and institutions as not good enough for them. They saw that a separate small nationality half way between the Zambesi and the Cape, blocking progress, was a thing that might enlist the sympathy of gallant individuals, but could not warp the judgment of statesmen in its favor. Such a state would always be trying to make itself as important as its profession of independence prompted it to be, and would inevitably mar the welfare of the larger area which should be under one government, working for the welfare of the whole.

The new wine was bursting the old Dutch bottle. If the old bottle had the Old Testament in its favor, as its president declared, the New Testament had better texts for the hospitality and generous spirit of the new wine. The great colonists liked the demands for equal rights put forward by the "Outlanders." They disliked their avoidance by the Boers. They disliked yet more the Boer declaration of war against the British to foster obsolete privilege. They said "This is a war that concerns all who practise freedom in government. We fight with England."

And then came the spectacle which stands alone as a world wonder. Volunteers begged to be enrolled, not in scores, but by thousands. Men occupying peaceful and profitable places in civil life, but enrolled in the Canadian and other militia, offered their services to sail 7,000 or 10,000 miles to fight on the veldt for the queen's authority in Africa. Only a small representation from each enrolled regiment was taken, though in very many cases throughout the Canadian provinces whole companies, and more in each battalion desired to go. A fine body of infantry selected from every province, three excellent batteries of artillery, and a force of cavalry unique not only for the efficiency of its men, but also because its equipment was the gift of a patriotic Canadian, Lord Strathcona, was the contingent sent by the British North American Dominion. Had more men been wanted, more would have gone. And when they arrived at the Cape, eager to take part in warfare at the front, they were necessarily for a time obliged to guard communications, and undergo the drudgery inseparable from all good work, but doubly hard to bear when comrades are reaping the harvest of battle and glory at "the front."

But the opportunity came before long to show of what metal they were made, and at Paardeberg the desperate charge which immediately led to the surrender of Cronje's force, was led by the gallant son of the speaker of the Canadian House of Commons, Capt. Pelletier. A worthy descendant of an ancient French stock, the bravest among the brave, he and his comrades were ready to lay down their lives for the form of government which they knew at home as the outcome of the freedom known of old to Norman and British ancestors, and enjoyed by their race in the England they colonized, as well as in England's Canadian colony. Col. Otter, a most experienced and gallant officer, commanded the Dominion infantry. Col. Drury, an old friend of mine, of a New Brunswick English descent, was chief of the artillery, one of the batteries of which arm took part in Mahon's wonderful march to the relief of Mafeking.

At the Colonial exhibition I remember an old lady saying: "How proud the queen must be to think that all these countries belong to her." The old lady was right in thinking that the queen personally holds the hearts and the allegiance of all. But she was mistaken if she thought that her British governors could claim ownership. No, the great colonies have received and do receive Britain's full support. They in turn are ready to give their aid. But it is on no basis of legal allegiance, because such cannot exist between grown-up son and parent. It is in free alliance, based on common advantage, the more to be fostered and cherished on account of love and historic sentiment, and common use of institutions, that the connection exists.

The colonies belong to Great Britain only as Great Britain belongs to the colonies. It is the interest of the parent state to have these strong young men to guard her doors and give no harbor to her enemies. It is the young states' interest to keep their shores inviolable by the aid of the British navy, and their treasuries supplied by the confidence of British capitalists.

Canada has more people than had England in the days of Elizabeth. She has more than had the United States when they declared independence. More tonnage passes the Canadian Main Canal at the east end of Lake Superior than passes the Suez Canal. Australia is following fast in Canada's wake in population and prosperity. These are not states from whom allegiance can be exacted, or loyalty demanded, save as loyalty comes from pride in common ancestry, in heart-hatred of baser forms of government, in love of the glorious traditions of our history, in resolve to keep united whose union means freedom and progress, and a common effort toward one splendid ambition, namely, one liberty, one grand civilization, one flag, one empire that shall keep for all of its members the laws they themselves are ready to maintain, by preference in peace, and in necessity by war.

ARGYLE.

Canada, Modern Development of. When the 19th century opened the population of the five provinces of Prince Edward Island, Nova Scotia, New Brunswick, Lower Canada, and Upper Canada did not reach 270,000, and of the whole number at least 150,000 were French Canadians. Their total trade did not exceed $10,000,000, the public revenues were inadequate for the public requirements, and the British government was obliged to give considerable aid to the provincial treasuries. The government was directly controlled by the imperial secretary of state in London and his representatives in the several provinces. The governing authorities in the five provinces were these: A governor-general in Lower Canada — then the most populous section of British North America — who exercised a nominal supervision, as the royal representative, over all British North America; a lieutenant-governor in each of the other four provinces; an executive council in Upper and Lower Canada, generally composed of members of the legislative council; a legislative council in all the provinces appointed by the Crown, and in Nova Scotia, New Brunswick, and Prince Edward Island, exercising executive as well as legislative functions; an assembly, elected by voters possessing a small property qualification, in all the five provinces.

The imperial government certainly had the interests of British America at heart, but nevertheless it erected a structure of provincial government which was defective at its very foundation. The Crown was supreme in the executive and legislative councils, and the assembly had little influence over the administration of public affairs. The absence of a system of local or municipal institutions in the provinces was another serious weakness in the provincial machinery. The people were called upon to manage the affairs of a province before they had learned to administer their purely local affairs in city, township, or village. Despite these defects inherent in the system of government, the machinery worked with little friction for a while. The unfortunate war of 1812–5, in which Canada performed her duty to the empire with infinite patriotism, prevented political dissension, since all classes of people recognized the supreme necessity of uniting at this crisis to defend their homes and country. The war did much to solidify the various racial elements of British North America during its formative stage. Frenchmen, Englishmen, Scotchmen from the Lowlands and Highlands, Irishmen, and Americans, one and all, united to support British connection. But when peace was proclaimed and the legislatures were relieved from the pressure that the war had brought upon them, the politicians again got the upper hand. The machinery of government became clogged, and political strife convulsed the country from one end to the other. An «irrepressible conflict» arose between the government and the governed classes.

In all the provinces, but especially in Lower Canada, the people saw their representatives practically ignored by the governing body, their money expended without the authority of the legislature, and the country ruled by irresponsible officials. A system which gave little or no weight to public opinion as represented in the assembly was necessarily imperfect and unstable; and the natural result was a frequent deadlock between the legislative council, controlled by the official class, and the House, elected by the people. The governors necessarily took the side of the men whom they had themselves appointed and with whom they were acting. This system of government was generally worked in direct contravention to the principle of responsibility to the majority in the popular House. Political agitators had abundant opportunities for exciting popular passion. In Lower Canada, Papineau — an eloquent but impulsive man, having rather the qualities of an agitator than those of a statesman — led the majority of his compatriots. For years he contended for a legislative council elected by the people; for it is curious to note that none of the men who were at the head of the popular party in Lower Canada ever recognized the fact, as did their contemporaries in Upper Canada that difficulties would be best solved, not by electing an upper House, but by obtaining an executive which would only hold office while supported by a majority of the representatives in the assembly. In Upper Canada the radical section of the Liberal party was led by W. Lyon Mackenzie, who fought vigorously against what was generally known as the «Family Compact,» which occupied all the public offices and controlled the government.

Such was the political situation in Canada when Queen Victoria ascended the throne on 20 June 1837. If we survey the general condition of things in those troublous times, the prospect was not encouraging. The total population of the provinces did not exceed 1,350,000, nearly one half being French Canadians. Trade and commerce were quite paralyzed by the political discontent which had existed for years, and had already broken out into rebellion. The value of the whole trade of British North America — that is, of the imports and exports — was about $25,000,000. The revenue of all the provinces did not exceed $7,000,000, and in more than one province — notably in Upper Canada — it was insufficient to meet the ordinary expenditures. The total production of wheat did not exceed 5,000,000 bushels, of which the greater portion was raised in French Canada, despite the want of energy and knowledge displayed by the habitants in the cultivation of the soil. The seigniorial exactions — a heritage from the French régime — retarded settlement and enterprise in the province of Lower Canada. The excessive grants of land made by the Crown to the loyalists, military men, and the Anglican Church, kept valuable districts of Upper Canada idle and profitless for years. The little island of Prince Edward had been nearly all granted by ballot to a few landlords in a single day, and till the entrance of the colony into the Confederation in 1873, its progress was seriously crippled by the difficulties arising out of this wholesale disposal of the public domain. The means of communication in each province were most wretched, in the absence of a municipal system and local taxation, and as a result of the ownership of large districts by absentee proprietors. The only town of importance was Montreal, with a population of 40,000. Few streets in the cities were lighted or paved; buildings of architectural beauty were the exception. Denominational colleges existed for the higher education of youth, but the state had not in any degree intervened successfully in the establishment of a system of popular elementary

schools. In 1838 there was in all the public and private schools of British North America only one fifteenth out of a total population of 1,500,000. The administration of justice was satisfactory in all the provinces except Lower Canada, where justice was sadly clogged by national jealousies, which showed themselves constantly in the jury-box. As in the courts of law and in the legislature of French Canada, so it was in social and every-day life — the French Canadian in direct antagonism to the English Canadian. "I expected," wrote Lord Durham in 1839, "to find a contest between a government and a people; I found two nations warring in the bosom of a single state; I found a struggle not of principles, but of races." The special mission of Lord Durham, who was sent to Canada as governor-general in 1838, was a turning-point in the political development of the British North American colonies. As a sequence of his report, so replete with political wisdom, English statesmen of all parties, notably Lord John Russell, recognized at last the necessity of intrusting a larger measure of self-government to the people of the provinces — of giving them as complete control of their internal affairs as was compatible with the security of the empire. The union of the Canadas in 1841, when the French and English sections were equally represented in one legislature, was the first important step in the political development of all the provinces of British North America. Then followed between 1841 and 1849 the concession of responsible government in the fullest sense of the term, while the legislatures obtained control of the provincial revenues and taxes. At the same time came the repeal of the navigation laws which had fettered colonial trade since the days of Cromwell. The post-office was given to the Canadian government, and in fact all matters that could be considered to appertain to the provinces were now placed under their immediate legislative jurisdiction.

The Canadians, under the impulse of relatively unfettered action, went vigorously to work to lay the foundations of a municipal system, as indispensable to the operations of local self-government. The troublesome land question involved in the seigniorial tenure was settled after much agitation on terms favorable to vested interests, while the clergy reserves were also arranged so as no longer to favor one church at the expense of others, or to impede the progress of settlement and cultivation. The union of the Canadas lasted until 1867, when it had outgrown its usefulness, and the provinces found it necessary to enter into a federation, which had been foreshadowed by Lord Durham and advocated by many eminent men even before his time. The confederation of 1867 brought only four provinces into one territorial organization for general or Dominion purposes — Ontario, Quebec, Nova Scotia, and New Brunswick — and it was not until 1873 that little Prince Edward Island, the garden of the Gulf of St. Lawrence, united its political fortunes with those of the young Dominion. Efforts were made to bring in Newfoundland, but local considerations have always prevailed in that island over national sentiment, and it is still doubtful when this large colony, which has been placed by nature as a sentinel at the very portals of Canada will fall into line with its sister colonies in North America. One of the most important results of confederation in its early days was the annexation by the Dominion of that vast tract of country which up to that time had been almost exclusively in possession of the Indians and the traders of the Hudson Bay Company. Next came into confederation the province of British Columbia, which extends from the Rockies to the waters of the Pacific Ocean.

A new province of Manitoba, which is watered by the Red and Assiniboine rivers, and territorial districts as large as European states, were organized for purposes of government in the vast prairies of the west. Within a period of 30 years Canada has stretched from the Atlantic to the Pacific, and the territory now under her control is very little inferior in extent to that of the great republic to the south, and contains within itself all the elements of a prosperous future. It is unfortunately true that this result was not achieved until blood had been shed and much money expended in crushing the rebellious half-breeds led by Riel; but, apart from this sad feature of Canadian history, this important acquisition of territory has been attained under circumstances highly advantageous to the Dominion. Canada now possesses an immense territory of varied resources — the maritime provinces with their coal, fish, and shipping, together with a valuable, if limited, agricultural area, not yet fully developed; the large province of Quebec, with ranges of mountains on whose slopes, when denuded of their rich timber, may graze thousands of cattle and sheep, with valuable tracts of meadow lands, capable of raising the best cereals, and the finest cattle of the continent; the rich province of Ontario, the chief agricultural section of the Dominion, whose cities and towns are full of busy industries; the vast Northwest, still in the very infancy of its development, destined to give the Confederation several provinces outside of Manitoba, as large and productive as Minnesota, and to be the principal wheat-growing district of Canada; and, finally, the gold-producing province of British Columbia, whose mountains are still rich with undeveloped treasures, and whose mild climate invites a considerable industrious population to cultivate its slopes and plateaus and collect the riches of its river and deep-sea fisheries. Even that inhospitable Arctic region of the far northwest of Canada, through which the Yukon and its tributaries flow, appears to be rich with untold treasures of gold and other minerals, and promises to be a source of wealth to a country which is still in the infancy of its material development.

The people of the Dominion are well provided with facilities for every grade of education. The universities — notably those in Montreal and Toronto — stand deservedly high in the opinion of men of learning in the United States and in the Old World, while the grammar and common school system in the English-speaking provinces is creditable to the keen sagacity and public spirit of the people. In French Canada there has developed of late years an essentially literary activity, which has produced poets and historians — Ferland, Garneau, Crémazie, Fréchette — whose works have naturally attracted attention in France, where the people are still deeply interested in the material and intellectual development of their old colony. The successes of English writers have been

chiefly won in scientific and constitutional literature — especially by Dr. Todd and Sir William Dawson. The handsome volumes published by the Royal Society of Canada — established by the present Duke of Argyle when governor-general — give evidence of the intellectual activity of the best minds both of the French and English-speaking people. Bliss Carman, Charles G. D. Roberts, Wilfrid Campbell, Frederick George Scott, Duncan Campbell Scott, Archibald Lampman, and Ethelwyn Wetherald merit a high place on the roll of American poets. Sir Gilbert Parker has made Canadian romance popular on two continents. 'Sam Slick, the Clockmaker,' and other books by Judge Haliburton, a Nova-Scotian, are still the only noteworthy evidences we have of the existence of humor among a practical people, and his 'Wise Saws' and 'Sayings' were uttered more than 60 years ago. In art we have L. R. O'Brien, George Reid, John Hammond, Homer Watson, Robert Harris, J. W. L. Forster, W. Brymner, and Miss Bell, who have done much meritorious work.

Self-government now exists in the fullest sense of the term throughout the Dominion, as the result of the political struggles of 100 years. At the base of the political structure lie those municipal institutions which enable a people in every local division to make improvements, support schools, and even encourage public libraries. Then we go up higher to the provincial organizations, governed by a lieutenant-governor, nominated and removable by the government of the Dominion, and advised by a council responsible to the people's representatives; with a legislature composed, in only two of the provinces, of two houses — a council appointed by the Crown and an elective assembly — while in all the other provinces there is simply an assembly, chosen by the people either by universal suffrage or on a very liberal franchise. The fundamental law known as the British North America Act, which was passed by the Imperial Parliament in 1867, gives jurisdiction to the provincial governments over education, provincial works, hospitals, asylums, and jails, administration of justice (except in criminal matters), municipal and all other purely local affairs. In the territories not yet constituted into provinces there is provided an efficient machinery, each territory having a lieutenant-governor, appointed by the Dominion government; an advisory council to assist the lieutenant-governor, and a small legislative body of one house, elected by the people, which has the power of passing, within certain defined limits, such ordinances as are necessary for the good government and security of the still sparsely settled countries under its jurisdiction. In the Dominion Parliament, the representatives of the territories have all the rights and privileges of members of the organized provinces.

The government has jurisdiction over trade and commerce, post-office, militia and defense, navigation and shipping, fisheries, railways and public works of a Dominion character, and all other matters of general or national import. The appointment of a governor-general by the Crown, the power of disallowing bills which may interfere with imperial statutes and treaties, the right which Canadians still enjoy of appealing to the judicial committee of the privy council from the courts of the provinces, as well as from the supreme court of Canada; the obligation which rests upon England to assist the colony in time of danger by all the power of her army and fleet, the fact that all treaties with foreign powers must necessarily be negotiated through the imperial authorities — these are the most patent evidences that Canada is still a dependency of the empire. Even the restraint imposed upon Canada with respect to treaties has been modified to a great degree by the fact that England has acknowledged for 30 years that Canada should be not only consulted in every particular, but actually represented in all negotiations that may be carried on with foreign powers affecting her commercial or territorial interests. One of the most encouraging results of this political system has been not merely the material development of the Dominion, but the creation of that powerful national sentiment which best enables the whole political structure to withstand successfully any racial or party antagonisms which may put it to the test. French Canada, with its population of more than 1,250,000 people, still maintaining their language and special institutions, is no longer restive and uncertain of its future as in the years immediately preceding and following the rebellion. It is true that at times a spirit of antagonism is evoked between the French and the English elements, but the unfortunate state of things that existed before 1837 is no longer likely to return, and whatever jealousies or rivalries break out now and then above the surface are sooner or later carried away by a current of sound public opinion, anxious for the harmony of all classes and creeds, and only solicitous for the safe working of the union.

The next great step in the political career of Canada is a question which frequently occurs to Imperial as well as Canadian statesmen. It is not annexation to the United States — that is impossible; it is not independence — that is not even discussed under existing conditions. These are days of a dominant imperialism throughout the British empire, and the influence of that sentiment in Canada can be estimated from the enthusiasm with which Canadians rallied to the aid of England in South Africa. One thing is quite certain, that the national movement among all British-speaking people — indeed, among all such thoughtful French Canadians as Sir Wilfrid Laurier — is toward the placing of the relations between the parent state and its great dependencies on such a permanent basis as will strengthen the empire and give Canada even greater influence in the councils of the imperial state. SIR J. G. BOURINOT.

Cañada, kä-ñä'da, a Spanish term used to indicate a small cañon, or valley with steep rocky walls. The word was in use during the Spanish occupation of the Pacific coast and is still retained in the names of a few localities in New Mexico or California.

Canada Balsam, a pale balsam, resin, or oleoresin, obtained by incision from a Canadian tree, the American silver-fir, sometimes called the balm-of-gilead fir (*Abies balsamea*). Canada balsam is of the consistence of thin honey, drying slowly by exposure to the air into a transparent adhesive varnish. It is used to mount objects for the microscope, and for other optical purposes, its refractive power and transparency being equal to glass. Thus, when it is

sought to cut thin a piece of fossil wood, or anything similar, so as to subject it in favorable circumstances to microscopic examination, it is affixed to a more massive body by Canada balsam.

Canada Goose (*Branta canadensis*), the most abundant and generally distributed wild goose of temperate North America, breeding in the northern United States and the British provinces wintering in Mexico; an important game bird. Length about three feet; brownish gray above; ashy gray below; head, neck, bill, and feet black; a white patch extending over the chin and cheeks.

Canada Hemp, or **Indian Hemp,** a perennial herb, *Apocynum cannabinum*, of the dogbane family (*Apocynaceæ*), a native of North America. It has a strong fibre used by the Indians for twine, nets, woven fabrics, etc. See APOCYANACEÆ.

Canada Jay. See JAY.

Canada Rice, a floating grass (*Zizania aquatica*), growing in lakes and sluggish streams in Canada and the northern United States, yielding a grain that forms part of the food of the Indians, and is eaten by whites also. It is also known as wild, water, or Indian rice.

Canada Snake-root. See ASARUM.

Canada Sparrow. See SPARROW.

Canada Thistle. See THISTLE.

Canada Warbler. See WARBLER.

Cana'dian Embroidery, a kind of embroidery formed from small pieces of snake skin, fur, etc., intermingled with flexible pieces of split porcupine quills dyed in various colors.

Cana'dian Literature. See LITERATURE, CANADIAN.

Canadian Pacific Railway, a railway which crosses Canada from the Atlantic to the Pacific. One of the conditions upon which British Columbia entered the Dominion of Canada was the construction of such a railway. Eventually it was completed by a syndicate of capitalists, being opened for general traffic in June 1886. The Canadian Pacific Railway Company began by building a line connecting Winnipeg, Man., with the United States. At right angles to this line it started a line east and west from Winnipeg and in the course of two or three years had a line connecting Manitoba with Lake Superior at Fort William. With this original line in the middle of the continent as a nucleus the company extended its rails east and west, until it had a through line from Montreal on the St. Lawrence to Vancouver on the Pacific 2,900 miles long. When this through line was opened it was announced that the Canadian Pacific Railway was completed, whereas the actual fact viewed in the light of subsequent events was that the Canadian Pacific Railway was just begun. Branches were built covering the fertile productive wheat fields in Manitoba, until at the present time the Canadian Pacific has five parallel lines in the southwestern part of that province. In the east the company acquired lines carrying it from Montreal along the north shore of the St. Lawrence to Quebec and southwest from Montreal through the province of Ontario to Detroit. Eastward from Montreal railways were built or leased which carried the company across Maine and into New Brunswick and Nova Scotia, giving it ports on the Atlantic at St. John's and Halifax. At the west, in the mineral district of Alberta, lines have been built opening up the Slocan and Kootenay mineral districts and the coal deposits between Letchbridge and Crow's Nest. This latter line when complete will make a cut-off parallel to the main line, but just north of the international boundary. In addition to this development in Canada the company acquired control of the Minneapolis, St. Paul and Sault Ste. Marie Railway and the Duluth, South Shore and Atlantic Railway, in the United States. The Duluth, South Shore and Atlantic Railway begins at Sault Ste. Marie and runs west parallel to the south shore of Lake Superior, passing through the great Michigan copper deposits to Duluth. The Sault Ste. Marie Railway, with the same easterly terminus as the Duluth-South Shore, extends southwest to the twin cities of Minneapolis and St. Paul and then turns northwestward through Minnesota and North Dakota, and meets a branch of the main Canadian Pacific at North Portal. The total mileage of the system in 1893 was:

Canadian Pacific Railway	8,646 miles
Minneapolis, St. Paul and Sault Ste. Marie Railway	1,412 miles
Duluth, South Shore and Atlantic Railway	565 miles
Total of Canadian Pacific System	10,623 miles

The traffic of the Canadian Pacific Company is as diversified as the territory which it serves. Traffic returns as shown in the reports are not compiled on the same basis as the returns made by railways in the United States; that is, the table does not show the total tonnage of each class of freight, but the following table is of interest as showing the magnitude and diversity of its traffic, and the increase for the year ending 30 June 1902, over the preceding year:

	1901.	1902.
Flour (barrels)	3,735,873	4,921,993
Grain (bushels)	32,927,469	52,719,706
Live stock (head)	945,386	963,742
Lumber (feet)	899,214,646	1,033,569,377
Manufactured articles (tons)	1,945,386	2,288,234
All other articles (tons)	2,206,970	2,571,136
Total tons carried	7,155,813	8,769,934
Earnings per ton per mile	0.79 cents	0.75 cents
Number of tons carried one mile in	1901.	2,383,633,945
Number of tons carried one mile in	1902.	3,247,922,167

Passenger receipts per train mile amounted to $1.32 and freight receipts per train mile to $1.83, which are very high averages, when the large number of branch lines with light traffic which are worked is considered.

Canadian River, a river that rises in the northeast part of New Mexico, and runs generally east through Texas and Indian Territory to the Arkansas. Its length is about 900 miles, but it is rather shallow and not important for navigation. Its largest tributary is the Rio Nutria, or North Fork of the Canadian, which runs parallel to the main stream for about 600 miles.

Canadian Series, the lower of the two series into which the rocks of the Ordovician system are divided by American geologists. It comprises the Chazy and calciferous stages, principally limestones, and grades upward into the Trenton. See ORDOVICIAN.

Canadian Soldier, a pestiferous fly which annually visits, in the months of June and July, the cities near the Canadian border in the lower lake region. It travels in swarms, dashes against

the electric lights, and perishes by thousands. The same insect is known in other parts as the May-fly, water-fly, and shad-fly.

Canadian Turpentine. See CANADA BALSAM.

Canaigre, kăn-ā'gr, a species of dock (*Rumex hymenosepalus*) indigenous to the arid region of southern California, Arizona, New Mexico, northern Mexico, and western Texas. It is a perennial herb with tuberous roots from which a reddish or green stem rises to a height of about two feet and bears rather large leaves resembling those of other docks. The tubers, which resemble those of dahlia, have long been used locally as a source of tannin, and fairly successful attempts have been made to grow them upon a commercial scale for this purpose. Propagation is easily effected by means of the tubers, about 2,000 pounds of which are required to plant an acre. Preparation of the land and cultivation are the same as for other root crops, but harvesting is usually delayed until after the plants have become dormant. This is because the proportion of tannin to waste is greater than at the time the tops die. The season of active growth is during late winter and early summer, when the dormant season commences. The yield of roots often exceeds ten tons. For market the roots are either sliced and dried, or the tannin is extracted and concentrated. Fine leather is obtained from this kind of tannin.

Canajoharie, kăn-ạ-jō-hă'rẹ, N. Y., a village in Montgomery County, 55 miles northwest of Albany and about 9 miles north of Sharon Springs, on the south bank of the Mohawk River and on the Erie Canal. The town has two banks, a library, three weekly newspapers, machine shops, flour mills, planing mills, a brewery and manufactories of trunks, carriages, refrigerators, paper bags, and gloves. In the vicinity are stone quarries. Pop. 2,000.

Canal Dover, Ohio, a city of Tuscarawas County, situated on the Tuscarawas River and the Ohio Canal, and on the Pennsylvania and other railroads. There are deposits of coal, iron, and building-stone in the vicinity. The chief industries are in iron and steel, and the manufacture of racing-sulkies, baby-carriages, roofing, etc. Pop. (1900) 5,422.

Canal Du Mide. See CANALS.

Canal Ring. See TILDEN, SAMUEL J.

Canale, Nicolo, nē-kō-lō' kā-nā'lĕ, Venetian admiral, who flourished in the second half of 15th century. In 1469 he was commander of the Venetian fleet at Negropont (the ancient Chalcis), and succeeded in seizing the Turkish town of Enos. The cruelties perpetrated upon the inoffensive inhabitants created great indignation at Constantinople, and Mohammed II., with a view of resenting the outrages, besieged Negropont with a force of 120,000 men, and after a violent contest expelled the Venetians. Canale, to whom this defeat was attributed, was sentenced to death by the council of ten, but at the instance of Pope Paul II. and of other influential persons, his punishment was commuted to exile for life.

Canaletto, kā-nā-lĕt'tō, or **Canale, Antonio,** Venetian painter: b. Venice, 18 Oct. 1697; d. there, 20 Aug. 1768. He is celebrated for his landscapes, which are true to nature, and his architectural paintings. He is said to have first used the camera obscura for perspective.

Canaletto, Bernardo Belotti, bĕr när'dō bẹ-lŏt'tē, Venetian painter: b. 1724: d. Warsaw, 1780. He was nephew of Antonio Canaletto (q.v.), who was likewise a good artist, and painted many Italian landscapes. He lived in Dresden, where he was a member of the Academy of Painters.

Canals. Navigation canals, as distinguished from power or irrigation canals, may be classified in various ways. One is according to their magnitude, and the consequent traffic for which they are intended; as boat and barge canals, or ship canals. Or again, according to their source of supply; as pure canals, mere artificial cuts with no water but what is turned into them; tidal canals, varying with ebb and flow; and canalized rivers, with weirs to increase depth and a lock at one end, and if necessary, lateral cuts around falls or other obstructions. Or according to their geographical purpose: as isthmian canals, like those across Suez, Panama, and Corinth; peninsular, to save distance or a stormy passage, as those across Jutland, the Languedoc Canal from the Bay of Biscay to the Mediterranean, the Caledonian, the Chesapeake & Delaware (bays) across Delaware, etc.; canals around falls, as the Welland, Sault Ste. Marie, Ohio Falls, etc.; system-joining canals, as those connecting the Danube and Rhine, the Seine and Loire, Lake Erie and the Ohio or the Hudson, Lake Michigan and the Mississippi, the St. Lawrence and the Ottawa or Lake Champlain, etc.; or artificial-seaport canals, as the Manchester & Liverpool, to give inland cities access to the sea. Practically, however, the first is the only very useful one.

The chief problems in the construction and operation of a canal are: (1) To proportion its dimensions to the probable volume of traffic, in order to save interest, maintenance, and operation charges. (2) To give it the shortest and most easily constructed route, and the best lines and form, consistent with the cheapest maintenance and operation. (3) To provide and regulate a constant supply of water. (4) To shift vessels from one level to another most speedily and cheaply and with the least waste of water. (5) To gain the maximum of speed with the least injury to the embankment.

1. American and English barge canals have very largely gone out of use since the advent of railroads; and it is agreed that a principal reason is the small cargo they can float, making the expense of freightage heavy in proportion. As the operating expense of canals with thrice the carrying capacity is less than half as much again, it is certain that with enlarged size and a full business a great reduction in freight rates would be possible. But the latter clause is the dubious part: if the traffic were not commensurate, the added expense would still further handicap them as business ventures. It is therefore a very nice question exactly how large to make a canal; and has hitherto proven insoluble, except to large communities, which can afford to sink a part of the expense in the general «plant» of their industrial appliances.

2. A canal cannot, like a highroad or a railroad, have «grades.» Each level must be absolute until a new one is established; and it

must follow hills and valleys as it finds them, tunnel the former and build aqueducts across the latter or the river-courses, and change levels when needed. But locks are expensive both to build and operate, and delay traffic; the fewer the better on all grounds. It is therefore often thought cheaper in the long run, and a saving of time in transit, to take a longer route and save locks. The soil is also to be considered: rock or hardpan costs more to excavate, and a longer route may furnish cheaper cutting. On the other hand, in hard ground, the cut can be more nearly vertical and less excavation be needed. In soft ground the sides must have a heavy slope or they will cave, so that the top may be from two to two and a half times as wide as the bottom; in all ordinary ground some slope is needed; in rock cutting the sides are nearly or quite vertical, as also in passing through towns, where the sides are of masonry and space is a desideratum. The question of route is therefore anything but a simple one, and is complicated with many business and mechanical ones. The number of bridges, aqueducts, culverts, etc., to be built is an important consideration. The width must be sufficient to allow two of the largest vessels to pass abreast without fouling, and the narrower the way the more traction power is needed. The width of bottom is usually fixed at the beam width of two vessels, and the depth at 18 inches more than their draft. The excavation of canals is carried on like other large excavations, with machinery from the ordinary pick and shovel, scraper, and cart, to great steam excavators and dredges, powder and dynamite for rock blasting, and portable railroads for carrying off the material excavated, etc. Aqueducts have always masonry foundations or piers, supporting a trough of masonry, wood, or steel. When the interfering stream is small, it is carried under the canal by a culvert.

3. The provision of a supply of water might well be placed first, as the canal would be useless without it. If possible, the location is chosen so as to fill its summit levels from sufficient lakes or streams. Otherwise artificial reservoirs must be constructed, with all the care needed for the water supply of towns except as to quality. The drainage basin must be ample to supply loss of water by evaporation, leakage, and lockage, with reference to length of canal, number and size of locks, and volume of traffic; and the feeders properly calculated as to length and size. When an elevated supply is not to be had, pumping works take their place. Of the causes of wastage mentioned above, evaporation cannot be lessened. Leakage is prevented in porous soil by cementing or puddling the sides of the canal. But lockage is the constant drain on the supply, which has exercised much ingenuity in minimizing. One method of preventing waste is also connected with the regulation of overflow: to keep a "ladder" of locks far enough apart, say 100 yards, so that the discharge from upper to lower level shall not overspill: or an intervening pond must be formed. As overflow not only wastes, but may cause heavy damages and suits, and also injures the towpath, waste-weirs should be provided at convenient distances; and as a break would drain the entire reach before it could be repaired, these must be localized by stop-gates at short distances, making only a small basin to waste and do damage with its water. The towpath must also be so sloped and prepared as to prevent its soaking and miring or crumbling.

4. The lock is the chief agency for shifting boats from one level to another. Its principle is to open a small basin with one closed end into a larger one, thus raising or lowering the water of the smaller to the level of the larger without much affecting the latter. In practice, the lock is a chamber with its sides at the upper level and its bottom at the lower; and to save water, it is made as nearly as possible the size of the largest vessel that is to use it, with six inches to a foot of play at each side and end. The lateral walls in the more important canals are of stone. The ends are wooden or iron folding gates, opening up-stream; each made of two leaves pivoted in the walls, each leaf a little more than half the width of the lock, so that they shut together at an obtuse angle against the current, the weight therefore only serving to close them still tighter. When a vessel is to be brought from one level to the other, it is floated into the basin or "pound," and the gate shut behind it. A sluice or valve in the upper gate then admits water and slowly raises it to the upper level, or the one in the lower gate lets it down to the lower level, as the case may be. The total lockage takes all the way from 6 to 20 minutes. These sluices are worked by rack and pinion in the gate, or revolve on an axis; they are managed by long levers set in the top of the gate, and reached by a "running board" projecting over it. The gates themselves are also managed by levers except in the better equipped and important ones, where they are often worked by steam machinery, at a saving of half the time. To save time and expense of superintendence, the reaches are made as long as possible, and the locks bunched in one spot in "ladders" of several close together, like a flight of steps, with a high lift, rather than scattered along the route. As said above, these should be some way apart to prevent overflow. As the pressure on the gates and sides is very great, the limit of "lift" in a lock, or the vertical height to which the water is raised, averages not over eight or nine feet, and may be only three or four; though 12 is not very uncommon, and 18 has been attained at the Sault Ste. Marie. On the largest locks the water is admitted through a culvert parallel to the side wall of the lock, and opening into the centre through a tunnel; this is said to reduce the time of lockage considerably. Of course too sudden an admission of water would injure the boat. Pipes are also used.

It is evident that at each passage of a boat, the upper level has to supply water enough to fill the lock between it and the lower. It may be noted that the ascending traffic takes far more than the descending, because in the latter case the water displaced by the boat itself flows back into the upper reach, and remains there after the gates are shut. A 25-ton boat with an eight-foot lift costs 163 tons of water going up and 103 coming down. To economize this supply where water is scarce, two chief plans have been devised. One is to form at the side of the lock a reservoir equal in size. When the lock is to be emptied, the water is run into the reservoir until it and the lock are at the same level, which of course will be half height. The reservoir is then closed, and the remaining water in

the lock run off through the lower sluices in the usual way. On refilling the lock, before opening the upper sluices, one fourth the quantity required can be obtained from the reservoir, thus saving 25 to 40 tons of water at each passage. This delays the traffic, however, and has not been much used. Another method is now coming into use in the canals of largest traffic, at the spots where a number of locks are bunched, and therefore a great amount of water used and time consumed. This is a reversion to the oldest historic type, of lifting the boats by machinery instead of floating them up; except that instead of inclined planes for hauling up and gravity for letting them down, hydraulic vertical lift locks are used. In this system the lock is a chamber with gates and water, as in the other; but it is movable, and when the boat is run into it, is raised or lowered to level. Counterweights and flotation tanks are sometimes used to aid the hydraulic power. The first of these was built at Anderton on the Weaver River, England, in 1876; lift, 50 feet 4 inches; two troughs 75 by 15 by 5; hydraulic ram, with three-foot plunger. This lets through a 100-ton boat in a total lockage time of eight minutes, and takes the place of six ordinary locks, which would take at least an hour, and on an average considerably more. The next was at Les Fontinettes, northwest France, on the Neufossé Canal, connecting the North Sea ports with Paris; lift, 43 feet 1 inch; two troughs 139 feet 7 inches by 18 feet 4½ inches by 6 feet 10⅝ inches; hydraulic ram, 6 feet 6¾ inches plunger. This lets through a 300-ton boat in 20 minutes, and replaces five locks taking two hours. At La Louvrière, Belgium, on the Canal du Centre, connecting Mons with Brussels, there is a fall of 293 feet in 17 miles, and 213 of it in five miles. This has been overcome by five lifts, with hydraulic rams having plungers of 6 feet 6¾ inches, operated by turbines turned by the upper-level water; height of lift from 50½ to 63⅔ feet. Each of these has two troughs of 141 feet 1 inch by 19 feet ¼ inch by 8 feet 6 inches, and takes up 400-ton barges in 15 minutes. At Lockport, N. Y., on the Erie Canal, the original nine and later five double locks, with a lift of 54 feet 5 inches, have been replaced by a hydraulic balance, working two troughs 225 feet by 19 feet 2 inches by 9 feet, and raising 400-ton boats in 15 minutes of lockage, against half an hour to an hour and a half of old. Others are either built or building.

5. The maximum of speed thus far found compatible with safety and economy on canals is from three and a half to four miles. Higher speed not only involves much greater proportionate power for traction on account of the resistance in a narrow way, but injures the embankment by the wash of the waves. Even on a navigable small river, a steamer at eight or nine miles an hour will cut the banks badly; and it would destroy those of a canal, unless faced more solidly than is commercially practicable. Furthermore, if the canal were worked to its full capacity, the traffic would not be expedited unless lockage could be shortened. The question of power for hauling the boats has been variously solved. Sometimes men draw the boats by ropes from the towpath, sometimes they row the boats direct,—this mostly in China; most often animals on the towpath draw them with ropes, singly or in tows; sometimes locomotives replace the animals, and in one place (the Muscle Shoals Canal on the Tennessee) the locomotives exchange boats when they meet; on the Erie and the Delaware & Raritan, steam propellers are used; in still others, especially on the continent of Europe, the power is from a cable or an endless chain along the bottom of the canal, either gripped by the boat or wound over a drum on the bottom of the boat.

Historical.— The earliest artificial water channels were for irrigation and drainage; not to reclaim swamp land, other soil being too plentiful, but to regulate the overflow of rivers. These date from an immemorial past, certainly 3500 B.C. in Babylonia and Egypt, more probably 7000 at least. Very early also the larger ones must have been used for boat navigation, to transport agricultural and building materials; these combined drains and canals still exist in England, called "navigations," and the workers on them "navigators," and have given to the language the word "navvy" for construction laborers. At what period the first ones were dug primarily for navigation, and incidentally for irrigation, cannot be told. There is a tradition that the Suez Canal was dug under the Old Kingdom of Egypt before 2000 B.C.; it was certainly opened or reopened for small boats by Necho, about 600 B.C. About this time also Nebuchadrezzar of Babylon opened the Royal Canal between the Tigris and Euphrates, but Mesopotamia had been well canalized before. These two countries, indeed, invited canals, with their flat surface and long levels, and easy digging in sand or clay. It is probable that China also had canals before the Christian era, but evidence is wanting. The first canals were of course on one level; but with the light boats and great engineering skill of the ancients the step was not long to damming the water at different levels and hauling the boat over. The first system, not yet disused, was to pull the boat up an inclined plane and let it down by gravity; and this remained the only available method till modern times. Under Alexander and his successors in Egypt and the Seleucid empire, canals were much used: an important one was from Alexandria to the Nile, whose mouths were shut off by sandbars. Marius had one constructed 102 B.C. from the lower Rhone to the Mediterranean. Under Claudius there was one from the Tiber to the sea; and in Great Britain there are two which date from the Roman time, the Foss Dyke and the Caer Dyke, in Lincolnshire, of 40 and 11 miles respectively. In the 4th century Lombardy was canalized,—a very favorable spot from its great plain and many rivers; and near the end of the 5th century, Odoacer carried one from the Adriatic to Mentone above Ravenna. The downfall of Roman civilization stopped their development for a while; but under Charlemagne a fresh extension began, that monarch building canals to connect the Danube both with the Rhine and the Black Sea. In the Netherland bogs the system is that of nature itself, and began very early; here the canal is not so much an artificial channel as a remnant of the original sea, around which the land is built. In Britain as early as 1121, Henry I. deepened and made navigable the old Foss Dyke. The Grand Canal of China, about 1,000 miles long, a large part of it made up of canalized rivers, was completed

in 1289. That country has many other great systems connecting its internal waterways.

But obviously the boats transferable by such machinery must be small and lightly loaded; and the modern canal system, with long heavy boats and large cargoes, was first made possible by the invention of the lock. This doubtless developed out of putting dams close together with gates in them; but neither inventor nor even country of first use is certain. It has been claimed for two brothers, engineers of Viterbo in Italy, in 1481; also for Leonardo da Vinci the universal genius; and again for Holland a century earlier. The one certain fact is, that in the latter part of the 15th century they were in use in both countries, and spread rapidly through Europe. The first country to undertake on a large and systematic scale the connection of its leading systems by canals was France, in the 17th century. The Brière Canal, connecting the Seine and Loire, was begun in 1605 under Henry IV., and completed 1642 under Louis XIII. The Orléans Canal, uniting the same basins by the Loing, was completed 1675, under Louis XIV. The greatest of all, the Languedoc Canal, to connect the Bay of Biscay with the Mediterranean, was finished 1681. It is 148 miles long, 6½ feet deep, with a summit level of 600 feet; has about 119 locks and 50 aqueducts, and floats barges of 100 tons. France in 1879 passed a law making all its canals uniform at 6½ feet deep, with locks 126½ feet long by 17 wide. England was much later in taking up the system on a large scale, but when it did so, carried out a remarkable one, with great feats of engineering. The fathers of it were Francis Duke of Bridgewater and his famous engineer, James Brindley; and the beginning was the charter for the Bridgewater Canal in 1759. The names of Watt, Telford, Nimmo, Rennie, and other noted engineers are associated with it. The last inland canal in Great Britain was built in 1834. Among the leading ones are the Grand Junction, 128 miles; Leeds & Liverpool, 128; Trent & Mersey, 93; Kennet & Avon, 57. The great Irish canals are the Grand Canal, from Dublin to Ballinasloe, 164 miles, uniting the Irish Sea to the Shannon; and the Royal Canal nearly parallel to it for the same traffic, from Dublin to Torinansburg, west of Longford. The great canals of Scotland are the Caledonian and the Forth & Clyde, spoken of under *Ship Canals*. Early in the 18th century Peter the Great constructed a great system of canals and canalized rivers, 1,434 miles long, to connect St. Petersburg with the Caspian. The Danish Canal, 100 miles long, from the North Sea to the Baltic, was finished in 1785. The Gotha Canal, 280 miles long, connecting Stockholm with Gothenburg across Sweden, was planned 1716, but opened the first part 1810, the whole 1832. In 1836–46 Louis of Bavaria revived Charlemagne's old plan, connecting the Main (and so the Rhine) with the Danube, by a canal 108 miles long, 650 feet above the Main, and 270 feet above the Danube.

United States Boat Canals.— The first canal in this country was built in 1793, around the falls of the Connecticut River at South Hadley Falls, Mass.; the engineer was Benjamin Prescott of Northampton, afterward superintendent of the Springfield Armory. The lift was not by locks, but by inclined planes, the boats being run into a movable caisson, filled with water and hauled up by cables operated by water-power; locks were introduced later. In 1796 a canal was completed around Turner's Falls farther north in the same river, at Montague. "The Proprietors of the Locks and Canals on Merrimack River" were incorporated 1792, and opened their canal around the falls at Lowell to the mouth of the Concord, one and a half miles long and with four locks, in 1797; it was for the lumbering business, rafts, masts, etc. But the first general canal for passengers and merchandise opened in the United States was the Middlesex, a rival to the last, incorporated 1793, and completed 1804 at a cost of $700,000; it ran to Charlestown, 31 miles, was 24 feet wide and 4 feet deep, and fed by the Concord. A packet boat, the Governor Sullivan, plied regularly between Boston and Lowell, taking nearly a day. The first boat voyage to Concord, N. H., was made in 1814, and a steamer began passages in 1819. The canal was disused 1851. But much broader projects had been set on foot about the time of these local ventures; and several of the greatest afterward carried out, as well as some which have been chimeras rather from political developments than from any inherent impracticability, were broached even before the Revolution. Washington was deeply interested in canal schemes all through his life, and favored canals to connect all the great American water systems. The Potomac and Ohio, the James and Ohio, and the Mohawk Valley and Great Lakes connections, were all examined by him. The last named he looked over during the Revolution. In 1792 the Western Inland Navigation Lock Company was formed, and by 1797 had finished six miles of canals around the rapids at Little Falls, making a navigable way for 15-ton barges to Lake Ontario. Pennsylvania built several small canals in the two decades from 1790 to 1810, but they had little success. In 1784 Maryland and Virginia jointly granted a charter for a canal from Georgetown on the Potomac to the Alleghanies, under which up to 1822, when it was abandoned, some three quarters of a million dollars were spent in excavations, dams, and locks. But the great era of American canal-building, and of furious and losing canal speculation, was from 1810 to 1840; its definitive close was about 1850, since which year no boat canal has been built in this country except the Illinois and Mississippi. The entire system in the United States aggregates about 4,200 miles, nearly all in the belt from New York south to Virginia and west to Indiana. There are at present about 40 large canals in the United States, of which 14 are in Pennsylvania, 13 in New York, and 5 in Ohio. Some of the lines most important in their early days, and which gave great cities their start since confirmed by railroads, are now entirely disused; and a history of their fortunes would be of no more importance than of other bygone business ventures. Some of the leading existent ones, or those which may be only dormant, will be described.

Chesapeake & Ohio.— The fortunes of this system have shown how difficult it is to forecast business developments. As designed by Washington, it was to connect the Chesapeake and ocean navigation, by way of the Potomac, with that of the Ohio, by portages and high-roads from its terminus Cumberland at the foot of the Alleghanies; as a fact, its use has been

mainly from the accidental fact that Cumberland is near the Pennsylvania coal fields. The fortunes of the first company have been described. In 1823 commissioners appointed by Maryland and Virginia reported in favor of a new route in place of attempting to complete the old one; in 1824 the national system of internal improvements was inaugurated by act of 30 April, and a board of engineers in October 1826 reported on a canal from Georgetown to Pittsburg. As the cost was over $22,000,000, it was considered prohibitory then; and in 1829 the "eastern division" to Cumberland was authorized, by national, State, municipal, and private stock subscriptions. But the work had been inaugurated on 4 July 1828 by President J. Q. Adams, who struck the first spade; and it was fully opened in 1850. It is 184 miles long and 6 feet deep, 60 feet wide from Georgetown to Harper's Ferry, and 70 on an average from thence to Cumberland. It is fed from the Potomac by seven dams. The aqueduct at Georgetown over the Potomac was a very considerable engineering feat for its time; it rests on 12 masonry piers constructed by coffer-dams on rock 28 to 40 feet below the surface. At Paw Paw Bend, 27 miles east of Cumberland, the canal saves six miles by a cut-off and tunnel through the mountain, 3,118 feet long. The summit level is 613¾ feet above tidewater; the rise is accomplished by 74 locks from 6 to 10 feet lift. The whole work had cost over $9,500,000 when opened, and its total capitalized outlay had been over $15,000,000 when the bondholders foreclosed in 1890.

Erie Canal.—The State of New York finally bought the works of the Western Inland, above mentioned. In 1803 Gouverneur Morris suggested or re-suggested a broader plan, to make a navigable way not to Ontario but to Erie, and therefore from the new West to New York. De Witt Clinton eagerly took up the idea, threw his whole energies into pushing it, and made it a foremost part of his political programme, bitterly opposed by the Tammany and Van Buren wing. In 1808 Simeon De Witt was appointed to survey the Mohawk route. On 3 March 1810 a commission was appointed, with Gouverneur Morris at the head and Clinton a member; it made several reports urging the feasibility and business advantage of the canal, and Clinton's memorial to the legislature in 1815 is said to have carried conviction. At any rate, on 7 April 1816 an act was passed authorizing the construction of the Erie and Champlain canals; on 4 July 1817 the first ground was broken, at Rome; and on 4 Nov. 1825, during Clinton's governorship, the canal was formally opened from Albany to Buffalo, 352 miles. It had cost $7,602,000, but it reduced the freightage time between the termini from 20 days to 10, and the passenger time shortly to 3½, by a line of light packet boats with relays of horses at a trot; and reduced freights at once from $100 a ton to $10, and then to $3. It made central New York, largely uninhabited, at once a district of potential empire with settlers flocking in; secured for New York the domination of the American seaboard; and created or solidified the prosperity of the remarkable line of cities in its path. Its construction was justly considered a triumph of engineering ability: several of the stone aqueducts by which it was carried over the streams (it crosses the Mohawk twice) presented peculiar difficulties, and in places it was cut through solid rock. It was at first 40 feet wide and 4 feet deep; later enlarged to 70 feet at top, 56 at bottom, and 7 feet deep; still further deepened as below. It has 72 locks, 110 by 18, 57 of them double. The chief lifts are at West Troy, 188½ feet, surmounted by 16 double lift-locks; at Lockport, 54½ feet, at first by nine double locks, then by five higher ones, since 1895 by a hydraulic balance lift (above described); and at Albany, 20 feet. It is fed from Lake Erie, the Black River, and several lakes in its course. The total rise to Buffalo is 568 feet, which means that the general fall of water is to the eastward. After the New York Central paralleled it, the business declined, and for many years after the war seemed doomed to extinction. In 1883 all tolls were removed on the State's canals, and the navigation made free; but even this did not wholly arrest the decline, due to reasons heretofore stated. It being evident that the Erie must be enlarged to be an effective competitor of the railroads, in 1896 a referendum was taken on an expenditure of $9,000,000 for deepening it to nine feet. In little more than a year from the time that work was begun, this money was exhausted, and the task but partly completed. Elaborate plans were devised for turning it into a great barge canal, navigable for vessels of 800 to 1,000 tons. It has been officially estimated that this will cost $101,000,000, or $40,000,000 more than all the outlays upon the canal to date. The proposition was presented to the people in November 1903, and was carried by a popular majority of 250,000 votes.

Illinois & Michigan Canal.—This route connects the Mississippi system with the Great Lakes, and by the Welland Canal with the St. Lawrence. Its inevitability was plain by reason of the extensive use of the Chicago portage (from the Chicago River to the head-waters of the Kankakee, an affluent of the Illinois) by the Indians and trappers, it being only half a mile for boats, the shortest important portage on the continent. Chicago was one of the best trodden sites in America before white men came here. As early as 1822 Congress granted a right of way for such a canal, and in 1827 and 1854 made further grants. For some reason it hung fire for many years, though a host of surveys and estimates were made by the State and the nation. Work was prosecuted on it 1836–41, then suspended till 1845, and the canal was finally opened in April 1848. It had then cost $6,170,226. The western terminus is La Salle, at the head of steamer navigation on the Illinois River; its eastern is on the south branch of the Chicago, about five miles from its mouth in the city. The entire length is 96 miles, and the rise from La Salle to Lake Michigan is 145 feet, surmounted by 17 locks, 110 by 18; the capacity of boats is 150 tons. The original intention was to make a straight cut from Lake Michigan to the Des Plaines River, the chief branch which with the Kankakee forms the Illinois; but to save expense it was decided to use the Chicago River instead. Thence it runs to Summit on the Des Plaines, 8 miles; then 42 miles to the junction with the Kankakee; thence through the Illinois valley to La Salle. It has five navigable feeders, the Calumet, Des Plaines, Du Page, Kankakee, and Fox; and five large storage basins. The sum-

mit level at Bridgeport required pumping for supply; and two steam engines, delivering 15,000 cubic feet of water per minute, were used till 1870. These were also used for many years to help draw off the sewage of Chicago, which empties for miles into the river. By supplying the canal from the river, the lake water was drawn in to fill the vacancy, and so kept the river comparatively sweet. But the system was expensive, and the canal was deepened for some years, ending 1870, to carry the sewage by its own flow to the Des Plaines, reversing the current of the river. It proved insufficient, and in 1892 the Chicago Drainage Canal (q.v.) was begun, which was finished in 1900. It is 40 miles long to Joliet, 22 feet minimum depth, and 162 to 290 feet wide at top. A scheme has been mooted for years, to convert this into a huge ship canal to enable ocean-going steamers to ascend from New Orleans to Chicago, and so through the Great Lakes and to the St. Lawrence; but it depends on the co-operation of the national government. Another canal to connect the Mississippi and Lake systems, which has been under construction since 1892, is the Illinois & Mississippi, the only barge canal started for over half a century. It is a supplement to the Illinois & Michigan; running from Hennepin on the Illinois River, a little beyond La Salle, to the Rock River, 50 miles, and then by 27 miles of slack-water navigation down that river to Rock Island, Ill. It is to be 80 feet wide and 7 feet deep, with 37 locks.

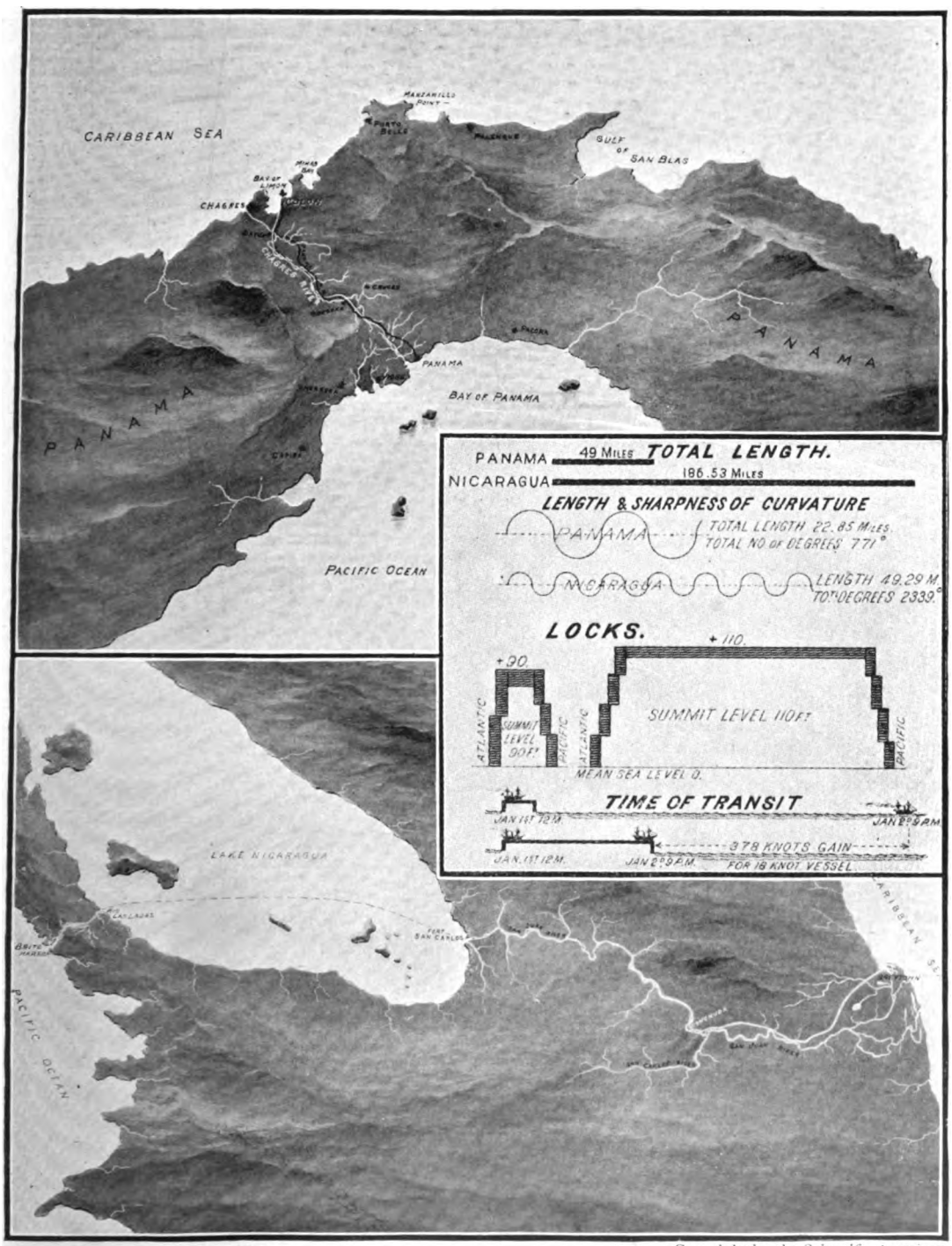
James River & Kanawha Canal.— This is a line partly existent and partly on paper, but interesting as probably the oldest North American canal scheme. The idea is accredited to Gov. Spotswood in 1716, when he explored the Blue Ridge; but the first active part was taken, as in all these early ventures, by Washington, who saw from his backwoods days the necessity of joining the eastern seaboard to the trans-Alleghanian territory by lines of communication. He personally explored the James River route in 1784, and induced the Virginia legislature on 5 Jan. 1785 to pass an act for improving the navigation of the James. Under this the James River Company was organized, 25 Jan. 1785, with Washington as president. No work was done, and in 1835 another company of the same name took up its task; beginning the construction of the section from Richmond to Lynchburg in 1836, and completing it near the end of 1841. The second division, from Lynchburg to Buchanan on the upper James, was begun before this was opened, and completed in 1851. In 1853 an extension of 47 miles to Covington on Jackson River was begun, but the war interrupted it, and it has never been resumed. In 1874 the cost of completing it to the Kanawha, including an improvement of the navigation of that river, was estimated at $60,000,000.

The Ohio Falls Canal.— This is a short canal, but from its location a very important one; it makes continuous navigation in one of the chief waterways of the continent. The first canal was built 1825–30, and called the Louisville & Portland. It was 1 7-10 miles long, 64 feet wide, had 8⅔ feet lift, and three locks, one at the head and two at the foot. An enlargement was begun in 1861, but interrupted by the war; in 1868 the national government included it in its river and harbor appropriation, and it was opened February 1873, having cost about $4,000,000. It runs west from in front of Louisville, Ky., to Portland; is a little over 11,000 feet long and 86½ feet wide, with a minimum depth of 6 feet assured by a dam at the falls. The water in the river varies from 6 to nearly 43 feet, and earthen parapets on the sides of the canal rise to 44 feet, based on stone walls, themselves built on the limestone rock through which the canal is cut. The upper lock has been raised, the lower two left as they were, but a branch with two locks has been added. At the head are flood-gates 46 feet 11 inches high. The upper entrance is 400 feet wide.

Among others existent or of past importance are the canal between the Chesapeake and Delaware bays, across the Delaware isthmus, built 1824–9; 13½ miles long, and supplied by pumps for 10 miles of it. An enlargement has been projected. The Morris Canal, 101 miles long, built in 1830, connects the Hudson at Jersey City with the Delaware at Phillipsburg, N. J.; it is owned by the Lehigh Valley R.R. The Delaware & Raritan, 43 miles long, built 1831–4, connects those rivers, and therefore New York and Philadelphia. The Delaware & Hudson, completed 1820, was once the great coal freight route between New York and the Pennsylvania mines; its company transformed itself into the railroad company of the same name, and has abandoned the canal. The Schuylkill Coal & Navigation Company's canal is 108 miles long. The Ohio & Erie Canal from Portsmouth, Ohio, to Cleveland, and the Wabash from Toledo, Ohio, to Evansville, Ind., were once of importance in building up these sections. For the Sault Ste. Marie, see *Ship Canals* below.

Canadian Canals.— Canada has a very extended and important set of canal systems, which may be classified as follows: (1) The St. Lawrence and Great Lakes system; which includes the Welland across the neck of land to the west of Niagara Falls, carrying continuous navigation from Lake Superior to Lake Ontario, and the canals around the rapids on the St. Lawrence, between the Thousand Islands and Montreal, making unbroken passage from Duluth to the ocean. The Welland will be spoken of below. The system also comprises the Burlington Bay Canal, through a bar at the head of Lake Ontario; (2) the two Ottawa River systems, one around the falls on the river between Ottawa and Montreal, the other by the Rideau and Cataraqui rivers and the connecting Rideau Canal to the lower St. Lawrence; (3) the Lake Champlain and St. Lawrence navigation, by the St. Ours & Chambly, along the Richelieu River; (4) the Trent River system, intended to connect Ontario with Huron through the Trent, but not completed; (5) St. Peter's Canal, connecting the Bras d'Or in Cape Breton with St. Peter's Bay on the south coast. Several other very important ones are projected.

Ship Canals.— Great ship canals across isthmuses or peninsulas, to make shorter sea routes or avoid stormy passages, or surmount falls, or to make seaports of inland cities, have been the speculations of dreamers for ages; but the developed and hurried commerce of this age has made some of them imperative. The ship canals of the world are nine in number, as follows:



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Panama Canal—Length, 49 Miles. Time of Transit, 11 Hours 14 Minutes.
Diagram Showing Superior Advantages of Panama Canal.
Nicaragua Canal—Length, 186.5 Miles. Time of Transit, 33 Hours.

COMPARISON OF THE PANAMA AND NICARAGUA CANAL ROUTES.

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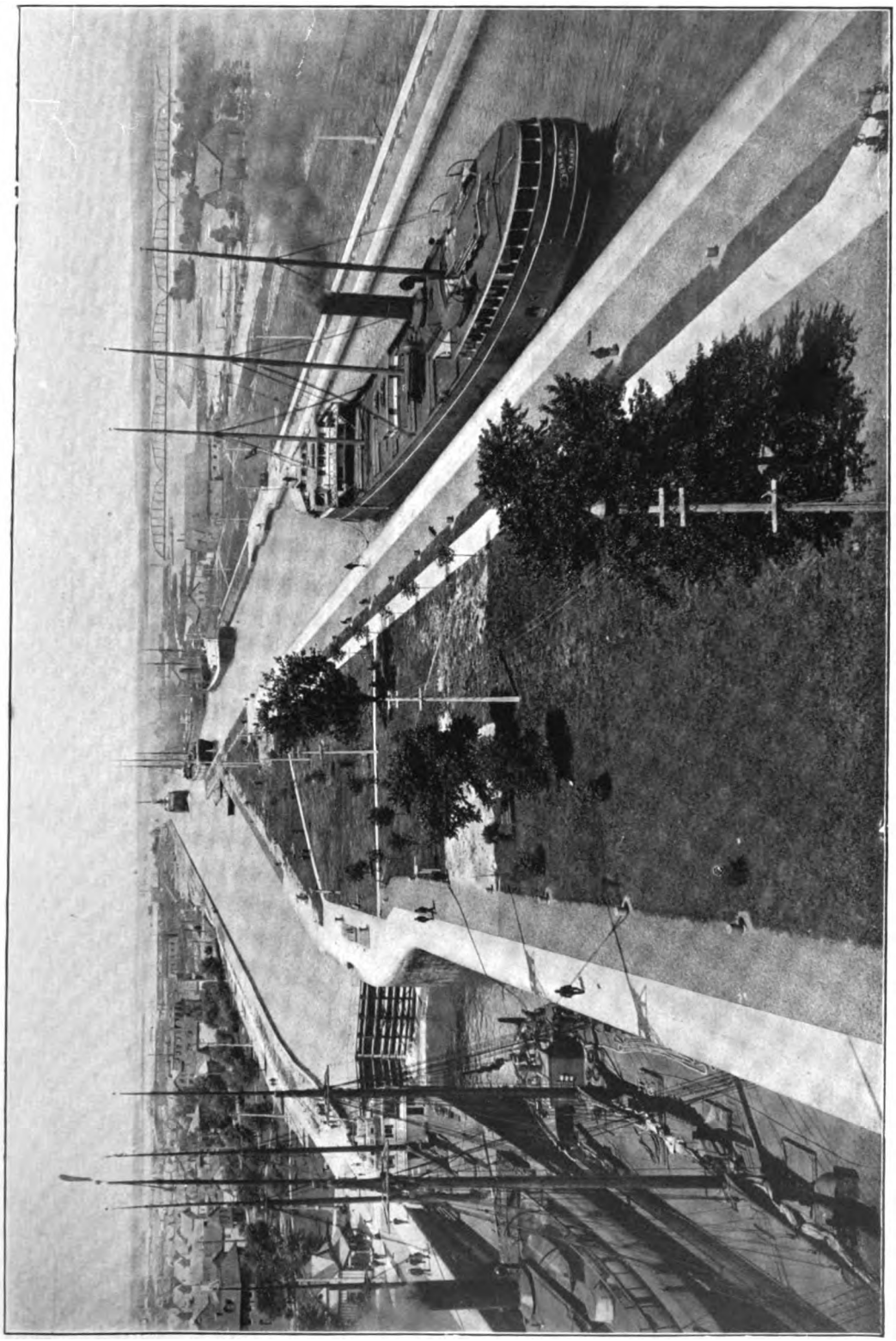

SAULT STE. MARIE CANAL.

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1. The Suez Canal, begun in 1859 and completed in 1869.

2. The Cronstadt and St. Petersburg Canal, begun in 1877 and completed in 1890.

3. The Corinth Canal, begun in 1884 and completed in 1893.

4. The Manchester Ship Canal, completed in 1894.

5. The Kaiser Wilhelm Canal, connecting the Baltic and North seas, completed in 1895.

6. The Elbe and Trave Canal, connecting the North Sea and Baltic, opened in 1900.

7. The Welland Canal, connecting Lake Erie with Lake Ontario.

8 and 9. The two canals, United States and Canadian, respectively, connecting Lake Superior with Lake Huron.

The Suez Canal is usually considered the most important example of ship canals, though the number of vessels passing through it annually does not equal that passing through the canals connecting Lake Superior with the chain of Great Lakes at the south. In length, however, it exceeds any of the other great ship canals, its total length being 90 miles, of which about two thirds is through shallow lakes. The material excavated was usually sand, though in some cases strata of solid rock from 2 to 3 feet in thickness were encountered. The total excavation was about 80,000,000 cubic yards under the original plan, which gave a depth of 25 feet. In 1895 the canal was so enlarged as to give a depth of 31 feet, a width at the bottom of 108 feet and at the surface of 420 feet. The original cost was $95,000,000, and for the canal in its present form slightly in excess of $100,000,000. The number of vessels passing through the canal in 1870 was 486, with a gross tonnage of 654,915 tons; in 1875, 1,494 vessels, gross tonnage, 2,940,708 tons; in 1880, 2,026 vessels, gross tonnage, 4,344,519 tons; in 1890, 3,389 vessels, gross tonnage, 9,749,129 tons; in 1895, 3,434 vessels, gross tonnage, 11,833,637 tons; and in 1900, 3,441 vessels, with a gross tonnage of 13,699,237 tons. The revenue of the canal is apparently large in proportion to its cost, the Statesman's Yearbook for 1901 giving the net profits of 1899 at 54,153,660 francs, and the total amount distributed among the shareholders 51,538,028 francs or about 10 per cent of the estimated cost of $100,000,000. The canal is without locks, being at the sea level the entire distance. The length of time occupied in passing through the canal averages about 18 hours. By the use of electric lights throughout the entire length of the canal passages are made at night with nearly equal facility to that of the day. The tolls charged are 9 francs per ton net register, "Danube measurement," which amounts to slightly more than $2 per ton United States net measurement. Steam vessels passing through the canal are propelled by their own power.

The canal connecting the bay of Cronstadt with Saint Petersburg is described as a work of great strategic and commercial importance to Russia. The canal and sailing course in the bay of Cronstadt are about 16 miles long, the canal proper being about 6 miles and the bay channel about 10 miles, and they together extend from Cronstadt, on the Gulf of Finland, to St. Petersburg. The canal was opened in 1890 with a navigable depth of 20½ feet, the original depth having been about 9 feet; the width ranges from 220 to 350 feet. The total cost is estimated at about $10,000,000.

The next of the great ship canals connecting bodies of salt water in the order of date of construction is the Corinth Canal, which connects the Gulf of Corinth with the Gulf of Ægina. The canal reduces the distance from Adriatic ports about 175 miles and from Mediterranean ports about 100 miles. Its length is about 4 miles, a part of which was cut through granite soft rock and the remainder through soil. There are no locks, as is also the case in both the Suez and Cronstadt canals, already described. The width of the canal is 72 feet at bottom and the depth 26¼ feet. The work was begun in 1884 and completed in 1893 at a cost of about $5,000,000. The average tolls are 18 cents per ton and 20 cents per passenger.

The Manchester Ship Canal, which connects Manchester, England, with the Mersey River, Liverpool, and the Atlantic Ocean, was opened for traffic January 1, 1894. The length of the canal is 35½ miles, the total rise from the water level to Manchester being 60 feet, which is divided between four sets of locks, giving an average to each of 15 feet. The minimum width is 120 feet at the bottom and averages 175 feet at the water level, though in places the width is extended to 230 feet. The minimum depth is 26 feet, and the time required for navigating the canal from 5 to 8 hours. The total amount of excavation in the canal and docks was about 45,000,000 cubic yards, of which about one fourth was sandstone rock. The lock gates are operated by hydraulic power; railways and bridges crossing the route of the canal have been raised to give a height of 75 feet to vessels traversing the canal, and an ordinary canal whose route it crosses is carried across by a springing aqueduct composed of an iron caisson resting upon a pivot pier. The total cost of the canal is given at $75,000,000.

Two canals connect the Baltic and North seas through Germany, the first, known as the Kaiser Wilhelm Canal, having been completed in 1895 and constructed largely for military and naval purposes, but proving also of great value to general mercantile traffic. Work upon the Kaiser Wilhelm Canal was begun in 1887, and completed, as above indicated, in 1895. The length of the canal is 61 miles, the terminus in the Baltic Sea being at the harbor of Kiel. The depth is 29½ feet, the width at the bottom 72 feet, and the minimum width at the surface 190 feet. The route lies chiefly through marshes and shallow lakes and along river valleys. The total excavation amounted to about 100,000,000 cubic yards, and the cost about $40,000,000. The number of vessels passing through the canal in 1900 was 21,571, with a tonnage of 4,282,258, and the dues collected amounted to 2,133,155 marks.

Three ship canals intended to give continuous passage to vessels from the head of Lake Superior to Lake Ontario and the St. Lawrence River are the Welland Canal, originally constructed in 1833 and enlarged in 1871 and 1900; the St. Mary's Falls Canal at Sault Ste. Marie, Mich., opened in 1855 and enlarged in 1881 and 1896; and the Canadian canal at St. Marys River, opened in 1895. In point of importance, measured at least by their present use, the canals at the St. Marys River by far surpass that of the Welland Canal, the number of vessels passing

through the canals at the St. Marys River being eight times as great as the number passing through the Welland, and the tonnage of the former nearly forty times as great as that of the latter. One of the important products of the Lake Superior region, iron ore, is chiefly used in the section contiguous to Lake Erie, and a large proportion of the grain coming from Lake Superior passes from Buffalo to the Atlantic coast by way of the Erie Canal and railroads centering at Buffalo. The most important article in the westward shipments through the Sault Ste. Marie canals — coal — originates in the territory contiguous to Lake Erie. These conditions largely account for the fact that the number and tonnage of vessels passing the St. Marys River canals so greatly exceed those of the Welland Canal. The Welland Canal connects Lake Ontario and Lake Erie on the Canadian side of the river. It was constructed in 1833 and enlarged in 1871 and again in 1900. The length of the canal is 27 miles, the number of locks 25, the total rise of lockage 327 feet, and the total cost about $25,000,000. The annual collection of tolls on freight, passengers, and vessels averages about $225,000 and the canal is open on an average about 240 days in a year.

Canaletto (proper name BERNARDO BELOTTO), Venetian painter: b. Venice 1724; d. Warsaw 1780. He was a pupil of his uncle, Antonio Canaletto, whose style he imitated perfectly. He worked in Dresden, London, and other places, and painted principally suburban buildings and scenes. He excelled in perspective.

Canaletto, Antonio, Italian painter of perspective views: b. Venice 1697; d. there 1768. In early life he was a scene painter, but having studied in Rome he returned to his native city and became an artist of note. He is said to have been the first who used the camera obscura in painting. His principal subjects, which are highly prized, are mostly views of the palaces and canals of Venice. As he was an extremely rapid worker and very industrious, he left a great number of works. His pictures of Venetian palaces and scenery, while greatly admired by some critics, are harshly censured by others, who consider his art as mere mechanism.

Canandaigua, N. Y., a village of Ontario County, 29 miles southeast of Rochester; at the northern end of Canandaigua Lake, and on the New York C. & H. R. and Northern C. R.R.'s. It is finely situated, on high ground, with a commanding view of the lake. The fishing and boating accommodations are excellent.

Industries, etc.— The chief manufactures are those of ale, pressed brick, and anti-rust tin and enameled ware. The Lisle Tin and Enamel Works have 600 employees, the Empire Pressed-Brick Works 150, the brewery 75. The power-house and shops of the Rochester & Eastern Interurban Electric railway, with 100 employees, are also located here.

Public Institutions, Buildings, etc.— The churches are Congregational, Episcopalian, Methodist Episcopal, Baptist, Presbyterian, Roman Catholic, and Wesleyan Methodist. There are two banks, with a combined capital of $200,000 and deposits of $1,200,000. Here are also located the Thompson Memorial Hospital, the Ontario Orphan Asylum (private), a private insane asylum, and an association library. It is also the seat of Canandaigua Academy, a public high school, and of the Granger Place School for Girls, a private secondary school.

Government.— The government is administered by a president, and a board of trustees of eight members, elected annually.

History.— Canandaigua was settled by New Englanders in 1789, and became a village in 1815. The name was originally Canandarqua, an Indian word signifying "the chosen spot."

Canandaigua Lake, N. Y., a body of water lying chiefly within the limits of Ontario County. It is 668 feet above the sea and 437 feet above Lake Ontario, and has an extreme length of 15 miles and an average width of one mile. Its outlet is the Clyde, a tributary of Seneca River. The waters abound in excellent fish.

Canani, Giovanni Battista, jō-vän'nē bät-tēs'tä kä-nä'nē, Italian anatomist: b. 1515; d. 1597. He discovered certain of the hand muscles, and was the first to observe the use of the valves in the veins.

Cananore. See KANANUR.

Canar, kä-fiär', Ecuador, a small province situated among the Andes, between the provinces of Chimborazo and Azuay; capital, Azogues. Pop. of province, 64,000.

Canard, ka-närd', or ka-när', a false report; a silly rumor. The origin of this use of the term is not known. It is the French word meaning "a duck," and is thought by some to be derived from the old phrase, *Vendeur de canard a moitie,* one who half-sells a duck or cheats in such a transaction; hence a liar, a guller, eac. According to an account of wide currency in different versions, the usage arose from a story of cannibalism among a flock of ducks that ate one of their number each day until they were reduced to a single survivor, who, it was argued, had eaten all his companions. The story became common in Paris, and afterward, when any marvelous recital was heard, the listener would shrug his shoulders and exclaim, *C'est un canard!* ("That's a *canard,* or duck!").

Canaries. See CANARY ISLANDS.

Canarium, kăn-ā'rĭ-um, a genus of plants of the order *Amyridaceæ.* The gum of *C. commune* has the same properties as balsam of copaiva. The nuts are eaten in the Moluccas and Java, but are apt to bring on diarrhœa. An oil is expressed from them, used at table when fresh and burned in lamps when stale.

Canary, a small, domesticated finch (*Carduelis canaria*), closely allied to the goldfinch (q.v.), and found throughout the Canary Islands, Cape Verde, and Madeira. Domestication, besides having modified the size and colors of this bird, has developed its power of song. It was introduced into Europe as a cage-bird early in the 16th century, and is now familiar in all parts of the world. Canaries in their wild state are about five inches long, and, like other finches, live mainly upon seeds, seldom eating insects. They build nests of moss and feathers in bushes and trees, often near dwellings; and their pale-blue eggs number four or five. Canaries are bought, bred, and sold in large numbers in England, Scotland, Belgium, and in the Hartz

Mountains, where their breeding forms an important household industry. The varieties are named, to a great extent, from the localities in which they are bred. Among birds valued for their beauty rather than for their power of song are: the British crested Norwich canary, the Manchester canary, which is noted for its abnormal size, it sometimes reaching a length of eight inches. The Scotch Fancy is a slender bird with long neck, its body, trunk, and tail, when in certain positions, curving into almost a half circle. The gold- and silver-spangled canaries are considered the handsomest. Their ground color is dull, spotted with gold or silver markings. The Belgian or humpback canaries are also bred for their beauty of plumage, and are remarkable by reason of the peculiar appearance they present by their broad shoulders, short neck, and small head.

Canaries bred for their power of song, and selling from $1 to $75, are those of the Hartz Mountains, which vary in color from a clear yellow to a bright green. The most valuable of all varieties is the South Andreasberg bird, bred solely for their power of song. Single birds are frequently utilized for the instruction of young birds, and are known as "campaninis." Other varieties are the cinnamon canaries and the cayernus, the brilliant red and scarlet of the latter being due to judicious feeding with red pepper.

Canaries are easily cared for, the only essentials being cleanliness, food, and water. The principal danger to the bird is a cold draught. The best food consists of canary-grass seed, hemp-seed, and a certain amount of greens. Acids are to be avoided, but sugar is beneficial in small quantities. Lime is essential to its welfare, and is most easily obtained in cuttle-fish bone. If their nails grow so long as to be troublesome to the bird, they should be occasionally cut with a very sharp scissors, thus running no chance of injuring the foot. Consult: Wallace, 'The Canary Book'; Belts, 'The Pleasureable Art of Breeding Pet Canaries.'

Canary-flower, an annual climbing plant (*Tropæolum peregrinum*), of the Indian cress family, a native of New Granada, cultivated for its showy yellow flowers.

Canary-grass. See CANARY-SEED.

Cana'ry Islands, or **Canaries,** a cluster of islands in the Atlantic, considered as belonging to Africa, the most easterly being about 150 miles from Cape Non. They are 13 in number, 7 of which are of considerable size, namely Palma, Ferro, or Hierro, Gomera, Teneriffe, Grand Canary (Gran Canaria), Fuerteventura, and Lanzarote. The other six are little more than mere rocks. The population in 1897 was 334,521, the area being about 2,808 square miles. The Canaries form a Spanish province. Lanzarote and Fuerteventura lie in the northeast of the group, Ferro is the farthest southwest. Through Ferro the first meridian used to be drawn. All are rugged and mountainous, frequently presenting deep ravines and precipitous cliffs to the sea, though having also fertile valleys and verdant slopes. The principal peaks are that of Teneriffe, 12,182 feet, and La Cruz, in Palma, 7,730 feet. Fuerteventura and Lanzarote, which are nearest the African coast, are less elevated and also less fertile than the others, and have much of an African character. Evidence of volcanic action is almost everywhere present, and volcanic disturbances have taken place on some of the islands in quite modern times. The flora generally resemble that of the Mediterranean region, the trees and shrubs including the oak, chestnut, pine, cedar, laurel, heather, etc.; but there are also plants that belong to the African region, such as the dragon-tree and euphorbias. Among the fauna may be mentioned the canary, the red partridge, and several kinds of lizards; there are no snakes. The goat is the chief domestic animal. The islands are somewhat deficient in moisture and severe droughts sometimes occur; tornadoes also are not infrequent. The climate is hot on the low grounds, temperate higher up, and generally healthy. The soil where suited for cultivation readily produces all kinds of grain, fruits, and vegetables in abundance; so that the name of "Fortunate Islands," which the ancients gave the Canaries, was well deserved. Some of the islands furnish good wine, especially Teneriffe and Palma. The Canaries constitute a valuable possession of Spain, and they serve as a winter resort for invalids from colder regions. This has led to the erection of hotels specially intended for visitors, to the making or improvement of roads, and to the providing of attractions of various kinds, including golf-courses, lawn-tennis grounds, etc. There are several places of worship for English-speaking visitors. The exports at present consist chiefly of bananas, tomatoes, and potatoes, shipped in great quantities to London and Liverpool, cochineal, sugar, wine, etc. The imports chiefly consist of textiles and other manufactured goods, cereals, coals, etc. Peaches, oranges, lemons, figs, and other fruits are cultivated. Teneriffe and Grand Canary are the two chief islands. Santa Cruz, the capital of the islands (pop. about 20,000), is a port on the northeast coast of the former, which also contains La Laguna, the old capital, Orotava, and other towns or villages. Orotava is a favorite resort of foreign visitors. Las Palmas, on the northeast coast of Grand Canary, is a more important place, with its new harbor, Puerto de la Luz, between three and four miles distant, protected by a breakwater. The city is rapidly extending, its streets have been improved and lighted by electricity. Numerous steamers engaged in the trade between Europe and Africa call here, and also at Santa Cruz. Though the Canaries were known to the ancients they fell out of the knowledge of Europeans till they again became known from the 12th or 13th century onward. They were claimed by the Spaniards in the 14th century, and in 1402–5 Jean de Bethencourt, a Norman adventurer, conquered Lanzarote, Fuerteventura, Gomera, and Ferro. By the end of the 15th century the Spaniards had subdued the original inhabitants entirely; and they almost extirpated them at a later period. These early inhabitants, who are known as Guanches, had attained some progress in civilization, as shown by remains still extant. They were no doubt of Berber stock. The present inhabitants are mainly of Spanish blood, though it is said the Guanche element may still be detected. See the separate articles on Teneriffe, Grand Canary, Palma, Ferro, and Lanzarote.

Canary-seed, the seed of a plant (*Phalaris canariensis*), belonging to the order of *Graminaceæ,* cultivated for its seed, which is used

principally as food for birds. In its early growth it is scarcely distinguishable from oats or wheat. With good cultivation it attains a height of three or four feet, and terminates in egg-shaped heads or ears, each containing upward of 100 seeds. The straw is of little value, either as fodder or 'itter, but the ears, especially when mixed with other kinds of chaff, are good food for horses. It requires a deep adhesive soil, and its produce per acre is about the same in quantity as wheat. It is a native of the Canary Islands, but is successfully cultivated elsewhere.

Canary Wine, a wine that comes from the Canary Islands, chiefly from the island of Teneriffe. It is not unlike Madeira.

Canary-wood, the light orange-colored wood of *Persea indica* and *P. canariensis,* trees of the laurel family.

Canas'ter, or **Kanaster,** originally, the rush-basket in which South American tobacco was packed and exported, and hence applied to a kind of tobacco consisting of the leaves coarsely broken for smoking.

Canastota, N. Y., village in Madison County, on the Erie Canal, and on the New York C., the West Shore and the Lehigh Valley R.R.'s. It is the centre of an agricultural district and manufactures agricultural implements, gasoline engines, boats, canned goods, etc. It has two banks, public library, churches, high school and two grammar schools. Pop. (1900) 3,330.

Can'by, Edward Richard Sprigg, American army officer: b. Kentucky, 1817; d. 11 April 1873. He graduated at West Point in 1839; served in the Mexican war, 1846–8; commanded the United States troops in New York during the draft riots of 1863; succeeded Gen. Banks in the command of the army in Louisiana, 1864; became brigadier-general United States army, and major-general of volunteers, 1866. After the war special duties were assigned to him, and in 1869 he took command of the department of the Columbia. He was treacherously shot by an Indian chief, while negotiating for the removal of the Modocs from northern California, in the "Lava Beds."

Canby, William Marriott, American botanist: b. Philadelphia, Pa., 1831. He was educated privately, and though a business man, has devoted much time to the study of botany. He gathered a fine herbarium of over 30,000 species of plants, which is now owned by the New York College of Pharmacy. A smaller collection was brought together for the Delaware Society of Natural History. He was one of the botanists attached to the Northern Pacific Transcontinental Survey.

Can'can, a dance, something of the nature of a quadrille, but accompanied by violent leaps and indecorous contortions of the body. The earlier and usual meaning of the word in French is noise, racket, scandal; and is derived, oddly enough, from the Latin conjunction *quamquam,* "although,"—a great squabble having arisen in the French mediæval law schools as to the pronunciation of this word.

Cancella'ria, a genus of univalve *Testacea,* belonging to the family *Muricidæ,* and Swainson's sub-family *Scolyminæ,* in which the shell is turbinate, scabrous, and generally reticulated, the spire and aperture nearly equal, and the body ventricose. Tate in 1875 estimated the known recent species at 71, and the fossil ones at 60, the latter from the Upper Chalk till now.

Cancellation, a method of abbreviating certain arithmetical and algebraic operations. When the product of several numbers is to be divided by another such product, any factors common to both products may be left out, or "cancelled." If divisor and dividend do not appear *in extenso* as products, the process of cancellation may yet be applied if common factors exist and can be detected. The work is substantially the same as that of reducing fractions to their lowest terms.

Can'cer (Lat. *cancer,* "a crab"), **Carcinus,** kär'sĭ-nŭs (Gr. καρκίνος, "a crab"), or **Carcinoma,** kär-sĭ-no'ma (Gr. καρκίνωμα, "cancer"), a disease so called from its hideous appearance or on account of the enlarged veins which surround it and which the ancients compared to the claws of the crab. It is called malignant because its symptoms are so aggravated and destructive to human life.

The causes of cancer are more or less obscure, but persistent local irritation and injuries are the established causes in a large majority of the cases. Hereditary influence has usually been considered a very powerful factor in the production of the disease. The consensus of opinion is opposed to the theory that cancer is of parasitic origin. It always begins as a local disease and is essentially a new growth and composed of tissue unlike that in which it grows. It is a disease of adult life as a rule, though it is frequently found in the young. In a general way it is most likely to attack an organ that has passed through its active period of existence, as the breast or womb. The womb and stomach are the organs in which primary cancer is most frequently found, though the disease may make its appearance in any organ or tissue of the body. When the disease begins it grows rapidly; there is loss of flesh, the neighboring lymphatic glands are involved through the absorbent glands; the tissue is infiltrated; and the body is affected generally. There is more or less pain, and the tumor is composed of cells and fibrous tissue in varying amounts, with more or less white fluid.

There are several varieties of cancer:

Hard or *Scirrhous Cancer,* or *Carcinoma Fibrosum.*— This is the usual form seen in the female breast, on the testicle, tonsil, skin, bone, eye, rectum, or any tissue, and is more frequent in women than in men. The disease spreads, and soon takes possession of the neighboring structures by infiltrating them. In this way it becomes gradually less movable and finally fixed. No tissue is able to resist its influence, muscles, skin, fat, and bone becoming filled with cancerous deposits as the disease advances. When the glands become enlarged they may press upon nerves, causing pain, and upon veins, causing swelling. In many cases the skin over the cancer contains small hard tumors known as tubercles; these are always indicative of cancer. Sometimes the skin becomes swollen and of a brawny appearance, indicating the most rapid form of the disease. When it attacks the female breast there is generally some slight pain, and as it advances there is a depression over the growth. Soon the nipple retracts, and if let alone it will ulcerate or break down and

have an offensive discharge. This form of the disease destroys life in from three to five years.

Medullary, Encephaloid, or *Soft Cancer,* in which the cell elements predominate, has all the cancerous peculiarities. Medullary cancer is the form which sometimes appears as a congenital tumor, and which attacks young adults and children, and is the cancer of young life. It grows rapidly, and runs its course much sooner than the hard form. It is found most frequently about the periosteum, bones, eye, uterus, tonsil, testicle, and ovary. It is specially liable to occur about the cavities and bones of the head and face. This form of cancer is so soft that it often seems like a sac of fluid.

Epithelioma is a term applied to cancers of the skin, because the composition of the cancer is similar to the epithelial elements of the true skin. These tumors affect the skin and mucous membrane, and never originate in any other tissue. They are called local cancers by many. Epithelioma first appears as a wart or small ulcer about the lips or face. It is also found in the tongue. scrotum, throat, rectum, penis, and clitoris. It grows slowly and is not liable to return when removed.

Rodent ulcers are forms of epithelial cancer, with the exception that the cells are smaller and do not extend by the lymphatics or have any secondary deposits. They usually begin on the face as dry warts and spread very slowly. They attack healthy people as well as weak or sick ones, and appear after middle age.

Colloid or *Alveolar Cancer* is one in which the intercellular spaces are filled with a glairy fluid like glue or mucus. It is most frequently found in the wall of the intestines or rectum and may be seen about the angles of the jaw, or in ovary and breast.

Melanosis, or *Black Cancer,* is a tumor containing pigment originating from a natural tissue which contains pigment, such as a mole or the choroid of the eye. Such tumors frequently appear in groups; the coloring matter being distributed throughout the mass in varying degrees. The secondary deposits are also distinguished by the presence of pigment. It is of the soft variety and runs a rapid course.

Treatment of Cancer.— There is no subject, perhaps, in the medical and surgical world, to which so much thought has been given in the last half-century as the treatment of this most formidable and alarming disease. A few years ago, when animal therapy was introduced, many of the preparations were extensively used in the treatment of cancer, and many persons proclaimed that a new era in the management of this disease had dawned upon the world, and in a little while no one would think of such a thing as a surgical operation in a case of cancer. While it has done some good, the beneficial results have not been satisfactory up to this time. Radiotherapy and phototherapy have been introduced recently in the treatment of cancer, and there are many experiments going on at this time, and much good has been accomplished in the treatment of cancers of the skin; but as yet there are no definite conclusions drawn from the use of these two agents. Perhaps in superficial carcinoma, involving large areas, radiotherapy is preferable to all other methods of treatment. Small superficial circumscribed areas are amenable to treatment with X-rays. In many cases it is best to remove the growth with a knife, and then follow it with the X-ray treatment. Some of those using this method say it is preferable. There seems to be some danger, in the treatment of carcinoma, of causing an inflammation which might carry the cancer cells to normal or inflamed tissue surrounding the growth. Another condition to be feared is the very great danger of burning the healthy skin. The use of the X-rays as a curative agent in the treatment of cancer of the skin is, too, in its experimental stage, and the weight of evidence is not sufficient to warrant any fixed conclusions, either for or against it, other than to say the trend of the medical mind is in its favor. Destruction by the use of caustics is a time-honored method of treatment and will continue to be employed by many. The agent used for that purpose is the chloride of zinc. The most highly scientific and satisfactory treatment for all forms of cancer, if seen early, is removal by the use of the knife. All the glands involved should be removed at the same time, as well as the neighboring ones, whether they are affected or not. Early recognition and prompt treatment are the only ways in which this disease can be cured.

Cancer, in astronomy, the fourth sign in the zodiac, marked thus ♋. The sun enters this sign on or about the 21st of June. He is at his greatest northern declination on entering the sign, and the point which he reaches is called the summer solstice, because he appears for the moment to stop in his progress northward and then to turn south again. The sun is then 23½° north of the equator, and a small circle of the sphere parallel to the equator at 23½° distant from it is called the Tropic of Cancer. The sun leaves this sign about the 22d of July. The constellation Cancer is no longer in the sign of Cancer. At present it occupies the place of the sign Leo.

Cancer-root, or **Beech-drops,** a branched parasitic plant (*Epiphegus virginianus*), of the order *Orobanchaceæ,* with brownish scaly leaves, indigenous in America, growing almost exclusively on the exposed root of the beech tree. The whole plant is powerfully astringent, and the root of a brownish color, spongy, and of a very nauseous bitter taste. It has been applied more externally than internally to the cure of cancer. Other plants of the same order are also called cancer-root.

Cancrin, Georg, gā ōrg′ kän-krēn′, COUNT, Russian general, statesman, and financier: b. Hanau, Prussia, 8 Dec. 1774; d. Saint Petersburg, 22 Sept. 1845. He served with distinction against the French (1812–15); was minister of finance from 1823 to 1844; and wrote on military and economic subjects, his most noted work being 'Military Economy in Peace and War.'

Cancrum Oris, or **Noma,** gangrene of the cheek, due to bacterial infection and mostly occurring in sickly children, especially those with scarlet fever or measles. It begins as a red spot on the cheek or at the angle of the mouth, spreads rapidly, and soon eats away the whole cheek, even the bone. There is fever, and death usually results. As soon as the disease is recognized it should be freely cauterized and the parts kept bathed in antiseptic solutions.

Candace, kăn'dą-sē, a name apparently common to the warrior queens of Ethiopia (Upper Nubia), between the Nile and the Atbara, in the later period of the kingdom of Meröe. The most distinguished of them invaded Egypt 22 B.C., was defeated by the Romans and obliged to sue for peace, which she obtained with a remission of the tribute imposed on her by Petronius. One of her successors is mentioned in Acts viii. 27; her high treasurer was baptized by Philip the Deacon on the road to Gaza.

Candahar'. See KANDAHAR.

Candaules, kăn-dô'lēz, king of Lydia, who lost his throne and life through his besotted admiration of the beauty of the person of his queen, in 718 B.C.

Can'dee, Helen Churchill, American journalist: b. Brooklyn, N. Y., 1861. She is an editorial writer on the New York *Evening Mail,* and has published: 'Susan Truslow' (1900); 'How Women May Earn a Living' (1900); 'Not on the Flag' (1901); 'An Oklahoma Romance' (1902).

Candeille, Amelie Julie, ăm-ā-lē zhü-lē kăń-dā-yē, French actress and composer: b. Paris, 31 July 1767; d. there, 4 Feb. 1834. She wrote libretto and music of the very successful operetta, 'The Beautiful Farmer.'

Candeish'. See KHANDESH.

Candela'brum, a word originally signifying candlestick, but usually denoting a support for a lamp or lamps among the Romans. The candelabra were of considerable size and often intended to stand upon the ground. They were made of wood, bronze, silver, or marble, and were often elaborately and beautifully adorned. Sometimes they had shafts in the shape of columns, which could be shortened or drawn out; sometimes the luxuriant acanthus formed a part of them; sometimes they represented trunks of trees entwined with ivy and flowers, and terminated by vases or bell-flowers at the top, for the reception of the lamps; and not infrequently the lamps were supported by figures. In ancient times Tarentum and Ægina were famous for their elegant candelabra, and Corinth also manufactured them. The Etruscan candelabra of bronze were celebrated.

Can'dia, or **Megalokastron,** Crete, a fortified seaport and capital of the island, situated on the north coast, 65 miles east of Canea. Its harbor admits only vessels of small draught. The governor and the Greek archbishop reside here. Soap is manufactured and exported. The fortifications of the city date from the time of the Venetian occupation, and in 1669, after a prolonged siege, it submitted to the Turks. Pop. estimated at 20,000.

Candia. See CRETE.

Can'didate, an applicant for an office, from the Latin *candidatus,* "white-robed," because, among the Romans, a man who solicited a public office appeared in a white garment — *toga candida* — and wore this during his candidature, which lasted for two years. In the first year the candidates delivered speeches to the people, or had them delivered by others. After this year they requested the magistrate to enter their names on the list of candidates for the office sought for. Before this was done the previous life of the candidate was subjected to a scrutiny in the senate, after the prætor or consul had received his name. If the senate accepted him he was permitted to offer himself on the day of election as a candidate. The formula by which permission was granted was "*Rationem habebo, renuntiabo*"; if he was not accepted he received the answer, "*Rationem non habebo; non renuntiabo.*" The tribunes often opposed a candidate who had been accepted by the senate. The morals of the aspirants, in the purer ages of the republic, were always severely examined. In the later period of the republic, nobody could obtain an office if he was not present and if he had not offered himself on three market days. On these days the candidates tried to insinuate themselves into the favor of the people. They went from house to house (*ambitio,* whence the word ambition), shook hands with everybody whom they met (*prensatio*), addressed each one by his name, for which purpose they generally had a nomenclator with them, who whispered the names of those whom they met into their ear. Cicero, therefore, calls the candidates *natio officiosissima.* They placed themselves on market days in elevated places in order to be seen. On the day of election they did the same. Favorites of the people accompanied them (*deductores*); some of their suite (*divisores*) distributed money among the people, which, though prohibited, was done publicly. *Interpretes* were employed to bargain with the people, and the money was deposited in the hands of *sequestres.* Sometimes a number of candidates united into parties (*coitiones*), in order to defeat the endeavors of the others. At last the grounds on which each candidate rested his claims to the office were read, and the "tribes" delivered their votes. The successful candidate then sacrificed to the gods in the capitol. To oppose a candidate was called *ei refragari;* to support him, *suffragari,* or *suffragatores esse.* In the early Church newly baptized Christians were called candidates, on account of the white robes worn by them for a certain period after celebrating the rite. The word "candidate" is also used by Protestants to designate a theologian who, having finished his studies at a university, is waiting for an appointment in the Church.

Candide, ou l'Optimisme, a famous novel by Voltaire, forming an epoch in French literature. In this book he ridicules the system of optimism with his usual spirit, and attacks revelation with plausible but superficial arguments, aiming to controvert the celebrated maxim of Leibnitz, "All is for the best in the best of all possible worlds." Among the descriptions in this work, that of the carnival at Venice is notable.

Candle, a solid cylindrical rod composed of beeswax, tallow, paraffine, or some other fatty substance, with a wick running longitudinally through its centre, designed for slow combustion with illumination. The wick is generally composed of a few threads of cotton yarn lightly twisted or plaited; but formerly, in home-made candles, dried rushes (*Juncus effusus*) were employed for this purpose. The process of making rushlights is described at length by the Rev. Gilbert White in his well-known 'History of Selborne.'

Candles are mentioned in several places in the Bible, but no direct evidence is given as to

their form or of what they were made. There seems to be a distinction, however, between candles and lamps,—the latter specifically calling for oil, while the candle is spoken of as being lighted and placed on a candlestick.

Considerable modern improvements have been made in the manufacture of candles. One of the most important of these consists in not employing the whole of the fatty or oily substances, but in decomposing them, and then using only the stearine or stearic acid of the former, and the palmitine of the latter class of substances. The animal fats are combinations of glycerine and fatty acids, principally stearic and palmitic, both solids, and oleic acid, which is liquid. If the latter be in excess, the fat will be a liquid and constitute an oil; if, on the contrary, the solid acids predominate, we shall have a more or less concrete fat, such as the tallow of the ruminants and lard of the hog. Stearic acid now constitutes the principal raw material for the manufacture of candles. The chief chemical agents employed to obtain the stearine are caustic lime, which, setting free the glycerine, produces stearate, margarate, and oleate of lime, in the form of a solid soap; and dilute sulphuric acid, by which this solid soap, after being reduced to powder, is effectually freed of its lime. By means of a subsequent bleaching process cakes of a perfectly white color, free from impurities, and fit for the manufacture of candles, are obtained.

Candles are commonly made by dipping, molding, or rolling. The former is the older method, and consists in arranging in a frame a number of wicks of the proper length and thickness, and dipping them a number of times successively in a tank of melted tallow or other fatty composition, with intervals for the incipient forms to cool and harden. These dippings are repeated until the candles have assumed the requisite thickness and weight.

Molded candles, as their name implies, are formed in molds. These are generally made of pewter, or an alloy of 20 parts of tin and 10 of lead, though glass has also been introduced. They are hollow cylinders of the length of the candle, and open at both ends, but provided at the upper end with a conical cap, in which there is a hole for the wick. A number of these molds are inserted in a wooden frame or trough with their heads downward; the wick is then drawn in through the top hole by means of a wire, and kept stretched and in the centre by a peculiar arrangement. The molds thus prepared are filled by running melted tallow of the proper temperature from a boiler into the trough. The candles remain in the molds for about 24 hours, but, as they improve by keeping, generally remain in the storehouse for a few months before they are exposed for sale.

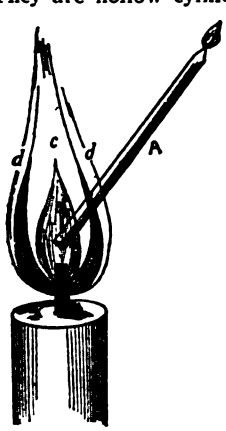

FIG. 1.—The parts of a candle flame.
a, Cold part, whence combustible gases may be extracted by means of a tube, *A*; *b*, blue part, having a higher temperature; *c*, luminous part.

The rolling of candles is confined principally to those made of wax. Although the bleaching of wax was described by Pliny, the use of this material for the manufacture of candles dates back only to the beginning of the 4th century. From its tenacity, and the contraction which it undergoes in cooling, wax cannot be formed into candles by melting it and then running it into molds. Instead, wicks, properly cut and twisted, are suspended by a ring over a basin of liquid wax, which is poured on the tops of the wicks, and, gradually adhering, covers them. Or the wicks may be immersed, as in the case of tallow "dips." When a sufficient thickness is obtained, the candles, while hot, are placed on a smooth table kept constantly wet, and rolled upon it by means of a flat piece of wood. In this way they assume a perfectly cylindrical form. Machines have been constructed, however, for the manufacture of such products. The large wax candles used in Roman Catholic churches are merely plates of wax bent round a wick and then rolled.

For preparing wax tapers, the wick is wound around a drum and is then made to pass into the melted wax under a hook placed at the bottom of the kettle. The wick, coated with wax, traverses a draw-plate which gives it the desired diameter, and then winds around a second drum. A little tallow, resin, and turpentine is often added to the wax in order to give it greater ductility.

Wax matches, also, which are generally of paraffine, are made with the draw-plate. They are afterward cut to the proper length and tipped with a paste of inflammable material. The use of wax for candles, by reason of their cost, was never very widely diffused, and of course at the present day is likely to diminish greatly. See WAX.

Hollow candles are provided with three apertures extending throughout their entire length. They offer the advantage of not guttering when burning. They are manufactured by means of a special machine, the molds of which contain three solid rods, which are withdrawn before the solidification of the mass.

At the beginning of the 18th century, spermaceti, a product of the cachalot, or sperm whale, came largely into use for the manufacture of candles. The competition of other materials and the decline of the whale fisheries limit its use at the present day.

Cetin, a form of spermaceti, is too brittle and lamellar in texture to use alone in candle-making. These defects are corrected by the addition of about three per cent of wax.

Paraffine candles came into general use about 1850. When crude petroleum is distilled the products obtained consist of light oils employed for illuminating purposes, and heavy oils used as lubricants. These latter, upon cooling, yield a solid substance of waxy consistence and deep color, called paraffine. This material, when purified, gives a white, odorless combustible substance, which is made into candles which give a brilliant but slightly smoky flame. Objections to their use are that at the moment of extinction they emit a disagreeable odor, and that they are too fusible and apt to become distorted in a warm atmosphere. For these reasons paraffine is generally mixed with stearic

acid. The use of paraffine candles is most common in Great Britain. See PARAFFINE.

Ozokerit, or *cérésine*, which is also used in the manufacture of candles, resembles paraffine in appearance. It is obtained by purifying a sort of natural mineral wax, the principal deposit of which is found in Galicia. It is not much used except in Germany and Austria. Since cérésine candles melt at a higher temperature than paraffine, they undergo no deformation when used.

Palm-oil is obtained from the west coast of Africa, especially the neighborhood of Lagos. The palm which yields it is the *Elais guineensis*, which produces a golden-yellow fruit of the size and shape of a pigeon's egg. By detaching its pulp from the kernel, bruising it into a paste, and then agitating it in boiling water, the oil is separated, and, rising to the surface, concretes as the water cools. About two thirds of it in weight consists of a peculiar white solid fat, called palmitine; the remainder is chiefly oleine.

The manufacture of candle-wicks is fully as important as the treatment of the combustible fats, and candle-makers have studied the principles of combustion with a view to discovering methods of producing the clearest light with the minimum of smoke, odor, and trouble in snuffing.

A flame is the result of the combustion of a gas. In a burning candle the fatty or other substances are melted and carried by the wick into the interior of the flame, where they are continuously converted into gas. We may compare the combustion of a candle to a microscopic gas-works, and, just as the gas-burner gives more or less light according as the pressure is varied, or the tip is more or less foul, or the proportion of air that reaches the gas is greater or less, just so a candle will give a different light according to the draft of air or the size and nature of the wick. Too large a wick would absorb the melted material too rapidly, the flame would be unduly increased, and the feeding of it would be effected under unfavorable conditions. Too small a wick would produce the opposite effect; around the periphery of the candle there would form a rim, which, no longer receiving a sufficient quantity of heat, would remain in a solid state; the cavity that serves as a reservoir for the liquefied material would become too full; and the candle would gutter. So the section of the candle, the size of the wick, and the draft of air in the flame must be apportioned in such a way that there shall always be an equilibrium between the quantity of material melted and that decomposed by the flame. The purity of the air, too, must be taken into account, for, just as a man needs pure air in order to live in health, so a candle has need of the same in order to burn well. During an evening party it may be observed that the brilliancy of the candles diminishes in measure as the air becomes impoverished in oxygen and enriched with carbonic acid.

In the flame of a candle four parts may be distinguished. The dark nucleus, *a* (Fig. 1), is formed by the gas resulting from the gasification of the combustible bodies. This gas may be ignited at the point of a glass tube, *A*, introduced into the flame. Since the air directs itself especially toward the axis of the flame, the azure-blue part, *b*, presents a comparatively low temperature in the illuminating envelope, *c*. The oxygen but partially suffices for the combustion, while in the non-illuminating part, *d*, products of the incomplete oxidation burn in the air in excess.

The wick must be placed in the centre of the candle, or else it will remain too long, produce smoke, and darken the flame. If the end remains exactly in the centre the air will not reach it, and the wick will carbonize and form a "thief" or "waster," which, falling into the cavity at the top of the candle, will make the latter gutter, and end by obstructing the wick.

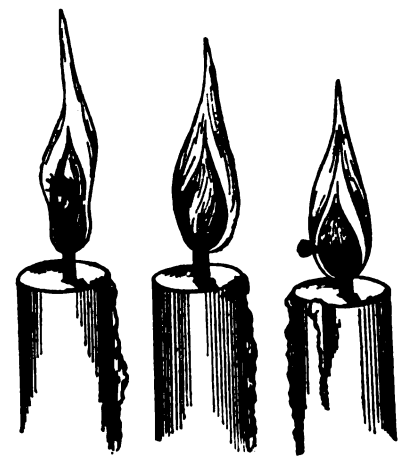

FIG. 2. FIG. 3. FIG. 4.

FIG. 2.—Tallow candle before snuffing. The wick becomes incrusted, and the flame becomes unsteady and smoky.

FIG. 3.—Tallow candle after snuffing. The flame is normal.

FIG. 4.—Wax candle. The wick curves, and a bead forms on its end inside the flame.

It then becomes necessary to snuff it. In order to do away with this inconvenience, Gay-Lussac and Chevreul, in 1825, recommended the use of flat or cylindrical wicks of an uneven texture, having the property of curving over. In the same year Cambacérès proposed the use of hollow plaited wicks, which, in measure as the candle burned, had the property of curving toward the white part of the flame. But ashes nevertheless formed, and, obstructing the wick, affected the light. In the month of June 1826 De Milly finally succeeded in solving the problem by impregnating the wick with boric acid. This latter, uniting with the ashes of the wick, gives rise to a fusible body, which is rejected in the form of a drop or bead toward the extremity of the wick. In Austria, wicks are impregnated with phosphate of ammonia, which gives analogous results. Balley has proposed a solution of sal-ammoniac of 2° or 3° Baumé.

Candle, Electric. See ELECTRIC LIGHTING.

Candle-fish, Oolakan, oo'la kăn, **Oulachon,** -kŏn, or **Eulachon,** ū'la-kŏn, a sea-fish (*Thaleichthys pacificus*), of the salmon family, frequenting the northwestern shores of America, of about the size of the smelt, to which it is allied. It is converted by the Indians into a candle simply by passing the pith of a rush or a strip of the bark of the cypress-tree through it as a

wick, when its extreme oiliness keeps the wick blazing. Oulachon oil, a substitute for cod-liver oil, is obtained from it. This fish is a favorite article of food in British Columbia.

Candle-fly, or **Lantern-fly,** a hemipterous insect of the group *Homoptera,* family *Fulgoridæ.* The large Chinese candle-fly (*Fulgora candelaria*) is remarkable for its greatly prolonged head, which was formerly believed to be luminous. Compare LANTERN-FLY.

Candle-nut, the nut of *Aleurites triloba,* the candleberry-tree, a native of the Moluccas, Pacific islands, etc., belonging to the natural order *Euphorbiaceæ.* It is about the size of a walnut, and yields an oil used for food and for lamps, while the oily kernels are also strung together and lighted as torches.

Candleberry, Bayberry, Candleberry Myrtle, Tallow-tree, or **Wax Myrtle,** a shrub (*Myrica cerifera*) common in North America, where candles are made from the waxy substance collected from a decoction of the fruit or berry. It grows abundantly in a wet soil, and seems to thrive particularly well in the neighborhood of the sea, nor does it ever seem to be found far inland. The berries intended for making candles are gathered late in autumn, and are thrown into a pot of boiling water, where the fatty or waxy substance floats on the top and is skimmed off. When congealed this substance is of a dirty-green color, somewhat intermediate in its nature between wax and tallow. After being again melted and refined it assumes a transparent green hue. Mixed with a proportion of tallow it forms candles, which burn better and slower than common tallow ones, and do not run so much in hot weather. They have also very little smoke and emit a rather agreeable odor. Soap and sealing-wax are also made of this substance. The plant has been cultivated in France and Germany, where it grows in the open air. Another plant belonging to the same genus is the sweet-gale (*Myrica gale*), which grows abundantly in bogs and marshes in Scotland. It is a small shrub with leaves somewhat like the myrtle or willow, of a fragrant odor and bitter taste, and yielding an essential oil by distillation. It was formerly used in the north of Europe instead of hops, and in some places it is still so used. The catkins or cones boiled in water throw up a scum resembling beeswax, which, collected in sufficient quantities, would make candles. The plant is used to tan calf-skins. Gathered in the autumn, it dyes wool a yellow color, and is thus used both in Sweden and in Wales. The dried leaves are used to scent linen and other clothes. Horses and goats eat the plant, while sheep and cows refuse it.

Can'dlemas, an ecclesiastical festival instituted by Pope Gelasius I. in 492, in commemoration of the presentation of Christ in the temple, and of the purification of the Virgin Mary. It is celebrated on 2 February, and has its name from the fact that in the Roman Catholic Church candles are blessed and carried in procession, in allusion to the words of Simeon, spoken of the infant Christ, "a light to lighten the Gentiles." See PURIFICATION.

Can'dler, Warren A., American clergyman: b. Carroll County, Ga., 23 Aug. 1857. He was graduated at Emory College in 1875, and was ordained to the Methodist ministry. He was pastor of various churches, and in 1888 was elected a bishop. He has been president of Emory College since 1888. He has written: 'History of Sunday Schools' (1880); 'Christus Auctor' (1899); etc.

Cand'lish, Robert Smith, Scottish clergyman: b. Edinburgh, 23 March 1806; d. Edinburgh, 19 Oct. 1873. He was educated at Glasgow University; in 1828 was licensed as a preacher, and in 1834 was transferred from Bonhill to St. George's, Edinburgh. In 1839 he threw himself into the conflict with the civil courts in the matter of the congregational right of election and independent church jurisdiction in matters spiritual, and soon became, next to Chalmers, the most prominent leader of the "non-intrusion" party and of the movement that culminated in the Disruption of 1843, and the formation of the Free Church of Scotland. From the death of Chalmers till his own death, Candlish was the ruling spirit in the Free Church. In 1862 he was made principal of the New College (the theological college of the Free Church), Edinburgh. He was the author of 'Contributions Toward the Exposition of the Book of Genesis' (1842); 'Reason and Revelation' (1859); 'The Fatherhood of God'; 'The Two Great Commandments' (1860); etc. See 'Life,' by Wilson (1880).

Candolle, Alphonse Louis Pierre Pyramus de, ăl-fôńs loo-ē pē-ār pē-rā-mü dė kăń-dōl, Swiss botanist: b. Paris, 28 Oct. 1806; d. 4 April 1893. He was son of Augustin de Candolle (q.v.). He was professor of botany and director of the Botanical Garden at Geneva, published numerous works on botanical subjects, and continued his father's 'Introduction to a Natural System of the Vegetable Kingdom.'

Candolle, Augustin (ō-güst-ăń) **Pyramus de,** Swiss botanist: b. Geneva, 4 Feb. 1778; d. there, 9 Sept. 1841. He studied at Paris, where he made his reputation by his 'History of Succulent Plants,' and 'Essay on the Medicinal Properties of Plants.' In 1808 he took the chair of botany at Montpellier, where he replaced the artificial method of Linnæus by the natural method of Jussieu, and published the remarkable 'Elementary Theory of Botany.' After the Restoration of 1815, he returned to Geneva, where he devoted the rest of his life to his great work, 'Introduction to a Natural System of the Vegetable Kingdom,' the continuation of which he entrusted to his son, together with an herbarium of 70,000 species of plants.

Candon, kăn-dōn', Philippines, a town of the province of Ilocos Sur, situated in the northwestern part of the Island of Luzon, very near the coast. Pop. about 16,000.

Can'dour, Mrs., a character in Sheridan's 'School for Scandal,' who conceals her slanderous nature under a pretense of frankness and kindness. The name is often used to denote people of such disposition.

Candy, or **Kandy,** a measure of weight in the East Indies. In Madras the candy is equal to 493.7 pounds, in Bombay it is 560 pounds, and in Ceylon it is equal to 500 pounds. It is divided into from 20 to 22 maunds. In Bombay there is a unit of capacity called the candy equal to 8.2 imperial bushels, and elsewhere a dry-

measure candy is found varying from 15 to 30 bushels.

Can'dy. See CONFECTIONERY.

Candy Ceylon. See KANDY.

Candytuft, a genus of plants (*Iberis*), of the natural order *Cruciferæ,* flowering in dense corymbs, and distinguished by an emarginate pouch with keeled and winged valves. It is indigenous to the countries bordering on the Mediterranean, and several species, as *Iberis umbellata, Iberis odorata,* and others, are cultivated in gardens.

Cane, kān, or **Ken,** a river in Bundelcund, British India, a tributary of the Jumna River. It follows a northeast course and is about 250 miles long.

Cane-brake, a term applied to the extensive growths of the *Arundinaria macrosperma,* the most gigantic of the grasses, which occur in the southern portions of the United States, and are to be found covering vast extents of country in the alluvial bottoms of Central and South America. The plant is not unfamiliar in the temperate zones, as its stalks are much used for fishing-rods. Cane-brakes are indicative of rich land, as they are only to be found in perfection in the most inexhaustible soils, where, having obtained a foothold, by their more rapid growth they usurp the place of the timber. In the southern portions of the United States the plant often reaches the height of 15 and 18 feet, with a base of one to one and a half inches diameter. In more southern latitudes it is very much larger. It grows as straight as an arrow from the root, tapering off finally in a beautiful, thread-like, feathery top. The leaves commence at about two thirds of the height of the plant, and seem to be attached directly to the stalk, as the branches on which they grow, save the very top ones, are not perceptible to ordinary observation. To the hunter, progress through a cane-brake is one of the most toilsome journeys that can be undertaken. Each step is disputed by the dense vegetation which rises before the intruder like a wall. In places, the cane is sometimes pressed down and interlaced, and then it becomes quite impenetrable. Under the most favorable circumstances the knife has to be freely used. Cane-brakes are often many miles in extent, always lessening in density as they reach high ground. They are favorite haunts for all kinds of game, which seek their solitudes either for protection or for the leaves for food. The deer and bear are particularly fond of the young green leaves, and upon them often become exceedingly fat. Cane-stalks being hollow, having no pith, and being divided inside every few inches into sections, they are very combustible when dried in the sun; and the air confined within the hollow sections, warming by the external heat, explodes with very considerable force, so that a cane-brake on fire gives the idea of a continued roar of distant musketry.

Cane Ridge Revival. See REVIVALS, AMERICAN.

Cane Sugar. See SUGAR AND SUGAR-MAKING.

Canea, kä-nē'a (Greek KHANIA), Crete, the chief commercial town of the island, situated on the northwest coast, with a good harbor. It occupies the site of the ancient Cydonia, but the present town is due to the Venetians, from whom it was wrested by the Turks, after a two years' siege in 1669. Canea is the principal mart for exporting the productions of the island. Pop. about 20,000. See CRETE.

Canella, a genus of plants belonging to the order *Guttiferæ,* but of which the affinities are so doubtful that it has been made the type of a distinct order, *Canellaceæ.* They are ornamental shrubs or trees. *C. alba,* the wild cinnamon, is a common West Indian aromatic evergreen tree, growing to a height of from 10 to 50 feet, with a straight stem branched only at the top. It is covered with a whitish bark, by which it is easily distinguished at a distance from other trees; the leaves are placed upon short foot-stalks and stand alternately. They are oblong, obtuse, entire, of a dark, shining green hue, and thick like those of the laurel. The flowers are small, seldom opening, of a violet color, and grow in clusters at the tops of the branches on divided foot-stalks. The fruit is an oblong berry containing four kidney-shaped seeds of equal size. The whole tree is very aromatic, and when in blossom perfumes the whole neighborhood. The berries, when ripe, are greedily eaten by the wild pigeons of Jamaica, and impart a peculiar flavor to their flesh. The canella of commerce is the bark of the tree freed from its outward covering and dried in the shade. It is brought to Europe in long quills, which are about three fourths of an inch in diameter, somewhat thicker than cinnamon, and both externally and internally of a whitish or light-brown hue, with a tinge of yellow. This bark is moderately warm to the taste, and aromatic and bitterish. Its smell is agreeable, and resembles that of cloves. In distillation with water it yields an essential oil of a dark-yellowish color, and of a thick tenacious consistence, with difficulty separable from the aqueous fluid. The remaining decoction, when evaporated, leaves a very bitter extract composed of resinous and gummy matter imperfectly mixed. It has been supposed to possess a considerable share of active medicinal powers, and was formerly employed as a cure in scurvy. Now it is merely esteemed as a pleasing and aromatic bitter, and as a useful adjunct in correcting more active though nauseous medicines. The powder is given along with aloes as a stimulating purgative.

Caneph'orus, a term applied to one of the bearers of the baskets containing the implements of sacrifice in the processions of the Dionysia, Panathenæa, and other ancient Grecian festivals. It was an office of honor, much coveted by the virgins of antiquity. The term is often applied to architectural figures bearing baskets on their heads, and is sometimes improperly confounded with caryatides.

Canes Venatici, kā'nēz vē-nāt'ĭsī ("the hunting dogs"), one of the northern constellations added by Hevelius in 1690, between Boötes and Ursa Major. Coming in after the time of Bayer, it has none of his assigned letters: but Baily, in the "B. A. C." in 1845, assigned the letters *a* and *b* to the two brightest stars, and they will probably stand, though they have not been universally accepted by astronomers. The former of the two stars is a well-known double. On the maps, the two dogs, Asterion and Chara, are represented as held in leash by Boötes, and

pursuing Ursa Major and the celestial pole, but this change in the figure of Boötes has of course been made since the introduction of Canes Venatici into the celestial train. The constellation is surrounded by Ursa Major, Boötes, and Coma Berenices.

Cañete, Manuel, mä'noo-el kän-yā'tā Spanish author: b. Seville, 6 Aug. 1822; d. 4 Nov. 1891. He was educated in Cadiz. For a long time he was an official in the ministry of the interior, and was later chamberlain to King Alfonso XII. His lyric poems, published under the title, 'Poesias,' are highly esteemed, and his dramas, also successful, include 'Un Rebate en Granada'; 'El Duque de Alba'; 'La Flor de Besalu'; and 'La Esperanza de la Patria' (with Tammayo). He is best known, however, as a dramatic critic and a writer on the history of the Spanish stage. His writings in the field of criticism had much influence in the reform of the stage, which at that time was badly corrupted. Among his other works are: 'Farsas y Eglosas de Lucas Fernandez' (1867); 'La Tragedia Llamada Josefina' (1870); 'Escritores Españoles é Hispano-Americanis' (1884); and 'Teatro Español del Siglo XVI.' (1884).

Canfield, James Hulme, American educator: b. Delaware, Ohio, 18 March 1847. He was graduated from Williams College in 1868; admitted to the Michigan bar, 1872, and practised law at St. Joseph, Mich., 1872–7. He was professor of history in the State University of Kansas, 1877–91; chancellor of the University of Nebraska, 1891–5; president of the Ohio State University, 1895–9, when he was appointed librarian of Columbia University, New York. He was secretary of the National Educational Association for five years, and its president for one. Besides numerous papers and addresses he has published: 'Taxation: Plain Talk for Plain People' (1883); 'The College Student and His Problems' (1902).

Cang, Cangue, or **Kia,** the wooden collar or portable pillory, weighing from 50 to 60 pounds, and fitting closely round the neck, imposed upon criminals in China. It renders the wearer unable to feed or otherwise care for himself.

Canga Arguelles, José, hō sā kän'ga ärgwĕl'yĕs, Spanish statesman: b. Asturias, 1770; d. 1843. In 1812 he was a member of the Cortes from Valencia, and rapidly rose to the leadership of the constitutional party; hence on the accession of Ferdinand VII. he was banished. Recalled in 1816, he became minister of finance in 1820, when the constitution was restored. Through the abolition of certain direct taxes, he caused financial disorder, and was forced to resign in 1821; was a member of the Cortes in 1822, but fled to England at the time of the revolution of 1823. Returning in 1829, he again was elected to the Cortes, where he remained true to his liberal principles. He wrote 'Memoria sobre el Credito Publico' (1820); 'Elementos de la Ciencia de Hacienda' (1825); and 'Diccionano de Hacienda' (1827–8).

Caniapuscaw, kăn-ĭ-ăp'ŭs-ka, a river in Labrador, outlet of a lake of the same name, flowing northwest into Hudson Strait; length, 400 miles.

Canicatti, kä-nē-kät'tē, Sicily, a city in the province of Girgenti, situated in a grain and fruit region. Here are also sulphur mines. The inhabitants are mostly engaged in agriculture. Pop. about 25,000.

Canic'ula, the Dog-star or Sirius (qq.v.); hence the term, "Canicular days," the dog-days (q.v.).

Cani'dæ, the dog tribe, comprising wolves, foxes, jackals, dogs, and the like, a family of carnivores, intermediate in structure and phylogeny between bears and hyenas. Their legs are long; the claws non-retractile, and in all except the lycaon there are five toes in front and four behind. The dentitions usually consist of three incisors, a great canine (a tooth which takes its name from its prominence in the dog, and is the seizing and tearing instrument); two small premolars, and two molars on each side of each jaw; but in the lower jaw there are three molars. All these teeth have the carnivorous characteristic of sharp-cutting crowns rather than broad, grinding surfaces, such as characterize the molar teeth of vegetable-eaters. Dogs are mainly diurnal and live in open uplands rather than in forests, where they obtain their prey by chasing it down; they occupy dens and burrows, and possess keen senses and great intelligence. See Dogs. For the fossil history of the family, see Carnivora.

Canid'ia, a Neapolitan woman whose real name was Gratidia, whom Horace loved, and who deserted him. Horace, in an ode, accused her of being a sorceress.

Canigou, kä-nē-goo', one of the peaks of the Pyrenees in France. It is in the department Pyrénées-Orientales, 24 miles from Perpignan; height, 9,137 feet.

Canina, Luigi, loo-ē'jē kä-nē'nä, Italian archæologist and architect: b. Casale, Piedmont, 23 Oct. 1795; d. Florence, 17 Oct. 1856. He was for some time professor of architecture at Turin, and afterward lived in Rome, where he published works of great value on the antiquities of Rome, Veii, Etruria, and Tusculum, among them 'Ancient Architecture Described and Illustrated by Monuments' (1844).

Caninde, kä-nēn'dā, a river of Brazil, flowing into the Parnahiba; length, 200 miles.

Ca'nis Major ("the greater dog"), a constellation of the southern hemisphere, remarkable as containing Sirius, the brightest star in the heavens.

Canis Minor ("the lesser dog"), a constellation in the northern hemisphere, immediately above Canis Major, the chief star in which is Procyon.

Canisius, Petrus, pā'trŭs kä-nĭsh'i-ŭs, Dutch theologian: b. Nimeguen, 8 May 1524; d. Freiburg, Switzerland, 21 Dec. 1597. He was the first man in Germany who entered the order of the Jesuits, of which he became a very active member. In 1549 he was made professor of theology, rector and vice-chancellor of the university at Ingolstadt, and in 1551 court preacher at Vienna. He afterward reformed the University of Vienna, according to the views of the order. His catechism, which has passed through more than 400 editions, is yet in use. He persuaded Ferdinand I. to adopt stringent measures

against the Protestants, and founded the colleges at Prague, Augsburg, Dillingen, and Freiburg in Switzerland. He was beatified 20 Nov. 1864.

Canisius College, an educational institution in Buffalo, N. Y.; organized in 1870 under the auspices of the Roman Catholic Church; reported in 1903: Professors and instructors, 31; students, 283; volumes in the library, 24,000; value of property (including endowment) $385,000.

Can'ities (Latin *Canus,* "hoary or gray-haired"), whiteness or grayness of the hair. When occurring in consequence of old age it is not a disease. Sometimes it happens suddenly, as a result of severe mental emotion.

Canitz, Friedrich Rudolf Ludwig, frēd'rĭH roo'dŏlf lood'vĭg kä nĭts (BARON), German poet and diplomat: b. Berlin, 27 Nov. 1654; d. there, 16 Aug. 1699. He studied law at Leyden and Leipsic, and was made state counselor in 1697 under Frederick I. of Prussia; in 1698 he was given the rank of baron. His poems were first published anonymously after his death (1700) under the title 'Nebenstunde unterschiedener Gedichte'; the second edition with the name of the author appeared in 1719. They had influence on style in opposition to the mannerisms of Lohenstein and other writers of the time. Those most popular with his contemporaries are the satires and an elegy on the death of his first wife.

Canker, a disease of plants. See APPLE.

Cankerworm, a caterpiller of a geometoid moth of the genus *Anistopteryx,* destructive to fruit-trees, especially apples. See APPLE.

Canlassi, Guido, gwē'dō kän-läs'sē, Italian painter: b. near Rimini, 1601; d. Vienna, 1681. He studied under Guido Reni at Bologna, and lived at Venice as court painter under the Emperor Leopold I., and later at Vienna. He is to some extent an imitator of Guido Reni, but is especially distinguished for his use of color. His chief works, mostly biblical or mythological subjects, are in Vienna, Munich, and Dresden.

Can'na, one of the Hebrides, 12 miles southwest of Skye, and 3 miles northwest of Rum. It is four and a half miles long, one mile broad, and four and a half square miles in area. The surface, nowhere higher than 800 feet, consists of trap. A hill here of basalt, called Compass Hill, reverses the magnetic needle.

Can'na, a genus of plants, some species of which have fine flowers, and some, from their black, hard, heavy seeds, are called Indian shot. There are about 30 species in tropical America, with ornamental leaves, creeping rootstocks, and panicles of red or yellow flowers. *C. indica* is the best-known species, and *C. edulis* yields *tous-les-mois.*

Can'nabis. See HEMP.

Cannæ, kăn'ē, Italy, an ancient town in Apulia, on the river Aufidus. Its site was between the modern Canosa and Barletta, famous for the great battle in which the Romans were defeated by Hannibal (216 B.C.). The Roman army under the consuls Æmilius Paulus and Terentius Varro consisted of 87,000 men, while that of the enemy amounted only to 50,000, among whom were 10,000 horse. The battle was brought on by Varro against the better judgment of his colleague. The Romans left their strong position at Canusium on the banks of the Aufidus, and the whole army crossed the river. Varro drew up his troops on the plain, with his right wing protected by the river. At the same time Hannibal forded the Aufidus and led his small army to the attack. The battle was long, and the Romans fell in great numbers, among them the consul, Æmilius Paulus, and both the proconsuls Servilius and Atilius. Hannibal's Numidian horse destroyed those who fled from the field. The victor made 13,000 prisoners. The Romans lost, according to their own lowest statements, 45,000 men; according to the highest, 70,000. Hannibal collected the gold rings of the knights who had fallen and sent some pecks thereof to Carthage.

Can'nel Coal. See COAL.

Cannes, kän, France, a seaport and health resort on the shore of the Mediterranean, in the department of Alpes-Maritimes. It is beautifully situated in a rich fruit district, has a mild and equable climate, and attracts numerous winter visitors. There are many hotels and fine villas, charming public walks, etc. Perfumes and soap are made here. Near Cannes, 1 March 1815, Napoleon landed on his escape from Elba. Pop. about 20,000.

Cannibalism, the act or practice of eating human flesh by mankind; anthropophagy; also the eating by an animal, or animals, of a member of the same race; as, of a wounded wolf by others of the pack. In the 'Odyssey' of Homer we have the story of Polyphemus devouring human flesh; and in Herodotus, the Massagetæ (i. 216) are said to eat their aged parents. The Padæi of India (Herodotus iii. 99) were in the habit of killing and eating their relations when they fell ill. Modern facts, the truth of which is put beyond all doubt, confirm the statements of Herodotus. Among the ancient Tupis of Brazil, when the *pajé* (chief) despaired of a sick man's recovery, he was by his advice put to death and devoured. Herodotus (iv. 26) also says that among the Issedones, when a man's father dies, his relations come and help to eat the dead man, whose flesh they render more palatable by mixing it with that of some animal.

In the Middle Ages these stories were wonderfully enlarged, and people who had not yet embraced Christianity were pretty generally set down as anthropophagi. When the Lombards invaded Italy at the end of the 6th century it was reported of them that they ate human flesh; and a century later the same aspersions were cast on the Slavonian tribes. It became the fashion to bandy the accusation between enemies: thus, during the Crusades, the Saracens said the Christians ate human flesh as well as the unclean flesh of swine; while the Christians on their side maintained that the Saracens ate men, women, and children, and were particularly fond of a sucking Christian babe torn fresh from the breast of its mother. The old travelers' narratives abound in stories of cannibalism, which we may almost invariably pronounce to be false. Few persons would now credit that the Indians and Chinese sold human flesh in the market, or that the Grand Khan of Tartary fattened his astronomers and magicians with the carcasses of condemned criminals; but the

statements of Marco Polo regarding the Battas, a people of Sumatra, have been confirmed.

When America was discovered, cannibalism was found to prevail to a very great extent, and as late as the year 1866 it is well known that two Brazilian officers exploring the Pachitea River were eaten by the natives. The practice was also common in Malaysia and Polynesia,— the case of Capt. Cook in the Sandwich Islands is well known. In many parts of Africa cannibalism is systematically practised; human flesh being regarded as a great delicacy, and even preferred to every other kind of food.

Cannibalism has been ascribed to various causes — to hunger, desire for revenge, and to various superstitions. Among the latter is the belief that the spirit of a brave enemy would pass into the body of the eater and thereby strengthen him for battle. More especially is this the case in regard to eating the heart. The former cannibals of the Sandwich and other Polynesian islands used to give to a human body destined to be eaten the equivocal term "long pig."

Cannibalism has been practised by members of civilized nations from time immemorial, when in dire distress from want of food. Travelers in desert lands and shipwrecked sailors have often resorted to this method of preserving the lives of many at the expense of the few, and perhaps as a general rule this has been done by mutual agreement to abide the hazard of a lottery to decide who should be the victim. Despite such agreement, the killing of a comrade in this manner is generally held to be murder and punishable accordingly. Several years ago, the survivors of the shipwreck of a British vessel resorted to this plan. They were subsequently rescued, and on their return to England were tried for murder, convicted, and sentenced to death. This sentence was afterward commuted to imprisonment, and later the prisoners were pardoned.

Canniff, William, Canadian physician: b. Thurlow, near Belleville, Ontario, 1830. He was educated at Victoria College, Cobourg, and studied medicine in Toronto, New York, and London, England, where he took the degree of M.R.C.S. He served in the Crimean war, 1856; returned to Canada, became professor of surgery in Victoria College; visited the Washington hospitals during the Civil War, and finally settled in the practice of his profession at Toronto. He was one of the originators of the "Canada First" movement. Besides many periodical articles, he has written 'Manual of the Principles of Surgery, Based on Pathology' (1866); 'The Medical Profession in Upper Canada, 1783–1850: An Historical Narrative' (1894); 'The Settlement of Upper Canada.'

Can'ning, Albert Stratford, English writer: b. 24 Aug. 1832. He is the second son of the first Baron Garvagh. He has been a prolific writer, and among his works may be mentioned 'Christian Toleration' (1874); 'Intolerance Among Christians' (1876); 'Religious Strife in British History' (1878); 'British Rule and Modern Politics' (1898); 'British Power and Thought' (1901).

Canning, Charles John (Earl), English statesman, son of George Canning (q.v.): b. near London, 14 Dec. 1812; d. London, 17 June 1862. He was educated at Eton and Oxford. He entered Parliament in 1836 as member for Warwick, and in the following year succeeded to the peerage, on his mother's death, as Viscount Canning. In 1841 he was appointed under-secretary of state for foreign affairs in Peel's government, and in 1846 commissioner of woods and forests. In the Aberdeen ministry of 1853, and under Palmerston in 1855, he held the postmaster-generalship, and in 1856 went out to India as governor-general. Throughout the mutiny he showed a fine coolness and clear-headedness, and though his carefully pondered decisions were sometimes lacking in promptness, yet his admirable moderation did much to re-establish the British empire in India. In 1858, when the government of India was transferred from the East India Company to the Crown, Canning became the first viceroy; and in the succeeding year he was raised to the rank of earl. From that time till his retirement in March 1862, the arduous task of undoing the mischief wrought by the mutiny devolved upon him, and his great success was a witness to his ability. See Cunningham, 'Earl Canning' (1891).

Canning, George, English orator and statesman: b. London, 11 April 1770; d. Chiswick, 8 Aug. 1827. His father offended his family by marrying a lady of beauty and accomplishments, but without fortune, and died in 1771, leaving her destitute. She however lived to see the success of her son, from whom she ever received the tenderest marks of filial love. Canning, who had inherited a small estate in Ireland, was educated at Eton. In 1787 he was entered at Oxford. His vacations were passed with Sheridan, by whom he was introduced to Burke, Fox, and other distinguished Whigs. But although Sheridan had already announced him in Parliament as the future ornament of his party, Canning entered into terms with Pitt, by whom he was brought into Parliament in 1793. During the first session he remained silent. In 1796 he was under-secretary of state. In 1797 he projected, with some friends, the 'Anti-Jacobin,' of which Gifford was appointed editor. Canning contributed many poetical and other articles to this periodical, the happiest of his efforts in this direction being the 'Needy Knife-grinder.' In 1798 he supported Wilberforce's motion for the abolition of the slave-trade. In July 1800 Canning increased his fortune and influence by a marriage with Joanna, daughter of Gen. Scott, a lady with a large fortune. The administration being dissolved in 1801, Canning became a member of the opposition until the restoration of Pitt in 1804. In 1807 he was appointed secretary of state for foreign affairs, in the Portland administration. A political misunderstanding with Lord Castlereagh led to a duel between that minister and Canning, in which the latter was slightly wounded. This dispute occasioned the dissolution of the ministry. In 1810 he opposed the reference of the Roman Catholic claims to the committee of the whole House, on the ground that no security or engagement had been offered by the Roman Catholics. Some of his most brilliant speeches were on this subject. The adoption of the measure being a matter of policy, the state of opinion, the condition of affairs, and the securities with which it should be accompanied, were with him elements of the question. He pro-

posed securities in 1813, which, with the bill, were rejected. He supported in 1812 and 1813 the same motion which he had opposed in 1810. To Canning was principally owing the first blow which shook the throne of Napoleon: the British policy in Spain was directed and animated by him. In 1812 he was elected member for Liverpool, from which he was also returned in 1814, 1818, 1820. In 1814 he was appointed minister to Portugal, and remained abroad about two years. In 1819 he declared his decided hostility to parliamentary reform in whatever shape. On the occasion of the proceedings relative to the queen, he declared that "toward the object of that investigation he felt an unaltered regard and affection"; and soon after resigned the presidency of the board of control, and went abroad. Having been nominated governor-general of India, he was on the point of embarking when the death of the Marquis of Londonderry called him to the cabinet as secretary for foreign affairs, 16 Sept. 1822. One of his earliest acts in this situation was to check the French influence in Spain, the French having sent an army into that country to put down the revolutionary party. By way of withdrawing the Spanish-American colonies from French influence he decided to recognize their independence; thus, as he afterward phrased it, "calling the New World into existence to redress the balance of the Old." He continued to support the propositions in favor of the Roman Catholics, and in 1825 communicated to foreign ministers the determination of the government to appoint *chargés d'affaires* to Colombia, Mexico, and Buenos Ayres. In consequence of the attempts made by Spain to assist the malcontents of Portugal, it was immediately determined by the ministry to support the regency of that country, and troops were sent to Lisbon in January 1827. On 12 April 1827 his appointment to be prime minister was announced. His administration was terminated by his death, but not until it had been crowned by the Treaty of London (6 July), for the settlement of the affairs of Greece. As an orator Canning was showy and graceful, with a brilliant wit and caustic satire, though neither formed on a very masculine taste. During his career the leading domestic subjects on which the British Parliament was called upon to legislate were the following: the liberty of the press, the emancipation of the Roman Catholics, the test and corporation acts, the corn-laws, and reform in Parliament. Those of a foreign nature were, among others, the various overtures of peace between Britain and France, the settlement of Europe on the overthrow of Napoleon, the treatment of Italy by the Austrians, the Spanish revolution, and recognition of the South American republics. On all these questions, with one or two exceptions, he supported the high Tory side. The chief exceptions were the emancipation of the Roman Catholics, and the recognition of the South American republics. He was also desirous of amending the corn-laws. Consult Stapleton, 'Political Life of Canning' (1831); Stapleton, 'Canning and His Times' (1835); Lord Dalling, 'Historical Characters' (1867).

Canning, Sir **Samuel,** English civil engineer: b. Wiltshire, 1823. He is best known in connection with the laying of the Atlantic cables in 1865–6 and 1869, and those in the Mediterranean and North Seas. He was knighted in 1866.

Canning, Stratford (Viscount Stratford de Redcliffe), English diplomatist, cousin of George Canning (q.v.): b. London, 4 Nov. 1786; d. 14 Aug. 1880. His father, Stratford Canning, who had been disinherited owing to an imprudent marriage, and had gone into business as a merchant, died a few months after his son's birth, and in consequence young Stratford and his mother removed to Wanstead. He went to Eton, and in 1805 he was elected to a scholarship at King's College, Cambridge. Before graduating he was in 1807 appointed by his great cousin, then foreign secretary, to be his précis writer, and in the latter part of that year was sent as second secretary with a mission to Denmark. In the following year he accompanied as first secretary an important mission to Constantinople, which resulted in the conclusion of a treaty of peace with the Porte on 5 Jan. 1809. In the summer of 1810 his chief, Sir Robert Adair, was transferred to Vienna, and Canning temporarily succeeded him as ambassador at Constantinople. Before the arrival of Adair's successor, Canning made his reputation as a diplomatist by the masterly way in which he conducted the difficult negotiations which led to the signing of the Treaty of Bucharest on 28 May 1812. This treaty put an end for the time to the war between Russia and Turkey, and thus left Russia free to resist the advance of Napoleon. Moreover, it firmly secured English predominance at Constantinople, and was in this respect the first notable triumph in the traditional British policy on the Eastern Question. In 1812 Canning returned to London, and after declining in 1813 the offer of the chief secretaryship to Lord Aberdeen's Vienna mission, accepted in the following year the post of envoy extraordinary and minister plenipotentiary in Switzerland. He held this post till 1818, and was completely successful in his endeavors to free Switzerland from French domination, and to erect it into a neutral federal republic. Shortly after his return he was appointed ambassador to the United States, and he arrived at Washington in the autumn of 1820. He was again in London in 1823. The diplomatic agreement arrived at in 1824 was however, thrown out by the United States Senate. After a brief but important mission to the Russian capital he was again sent to Constantinople in October 1825 as ambassador. In the following year he succeeded in again patching up a peace between Russia and Turkey, and thus prepared the way for a joint representation by England, France, and Russia on behalf of insurgent Greece. Negotiations were, however, abruptly broken off by the Sultan's indignation on learning of the battle of Navarino, and Canning was later in the same year engaged, along with the representatives of France and Russia, in drawing up proposals for establishing a Greek kingdom. These were ultimately forced on the acceptance of Turkey in a more stringent form as part of the peace treaty which ended the Russo-Turkish war of 1828–9. In 1829 he resigned his position and returned to England, where he was created G.C.B. He entered Parliament as member for Old Sarum, but he ultimately secured election for King's Lynn. After acting as special envoy to the Porte in 1831–2, and to Portu-

gal in 1832–3, he was in 1841 appointed for the third time ambassador at Constantinople. For a considerable period he was mainly engaged in assisting and encouraging the Sultan, Abd-el-Mejid, in his policy of reform, but after a visit to England in 1852, during which he was raised to the peerage, his efforts had to be directed to thwarting Russian designs. His diplomatic triumph over Prince Mentchikoff caused the czar in a moment of irritation to precipitate the Crimean war. He resigned in 1858, and the remainder of his career was passed mainly in retirement. In addition to a few volumes of poetry, he published works entitled 'Why am I a Christian?' (1873), and 'The Greatest of Miracles' (1876). A selection of his articles on eastern affairs was published in 1881 under the title of 'The Eastern Question.' See 'Life' by Stanley Lane-Poole (1888).

Canning Industry in America. The development in this country of the practical arts pertaining to the hermetical sealing of food, now so well known under the generic title of canning, is an interesting feature of the commercial growth of this country. Evolved from the studious and observant brain of an humble Frenchman, and tested through years of his plodding experience, the new method came amidst the throes of the French Revolution, in the year 1795, a veritable offspring of the First Republic. About 14 years later the French government, under Napoleon the Great, awarded the discoverer the prize of 12,000 francs, which long before had been offered for a method that would preserve alimentary substances without robbing them of their natural qualities and juices. Nicholas Appert, born in 1750, spent his life in brewing, wine-making, pickling, and the making of confectionery, living over 90 years, and continuing to the last to invest all funds he could obtain in the prosecution of his investigation in these different lines. He died, in 1841, neglected and alone. His children have received some benefit from his labors, the title of Chevalier being borne by a descendant of his to-day, indicating that the cross of the Legion of Honor had been awarded to him in recognition of his merits. This industry, which has now become essentially American, begins, therefore, exactly within the century. Appert had obtained financial assistance from English sources, and as a result we find that, about 1810, his method was being used in the factories of an English firm of purveyors.

In that year a patent was granted in England to one Peter Durand for a can, made of tin, to be used in hermetically sealing food, the patent also covering the use of glass, pottery, and other fit material. In the letters patent, it is stated that the new method was communicated to him by a foreigner residing abroad. Ezra Daggett, who was in the employment of this English firm, brought the secret, it is believed, to America between 1815 and 1818. In 1819, he was engaged in the packing of hermetically sealed food by this process in New York city, in company with his son-in-law, Thomas Kensett. The descendants of Mr. Kensett still have some cans of these goods in their possession which were put up in 1822, as the labels show. Salmon and lobster were among the earliest goods packed, and oysters also were preserved, according to these labels. In 1825, a patent was granted to Ezra Daggett and Thomas Kensett for an improvement in the art of preserving. The can was then called a "case," the label containing directions for opening it.

About the same time that Daggett came to America from England, Charles Mitchell arrived in Boston from Scotland. He was born in London, there learning the canning business as an apprentice. He left London in 1820, and on reaching Boston almost immediately entered the employment of William Underwood, who established the firm of William Underwood & Company, in 1822, to hermetically seal food. There is a lack of information concerning the development of the industry during the next 20 years, but it was throwing out roots from the New York and Boston plants. In 1843, the firm of Treat, Haliday & Company were canning lobsters in New Brunswick, and salmon in Maine. There is a supposition that Haliday brought the process from Scotland and joined Treat about 1840. Already there was a known distinction between the French (or Appert) process and the Scotch method. Appert used glass vessels only, but the Scotch method required the puncturing of the tin after the first cooking, and then recooking after the hole was soldered. About 1846, Wells, Miller & Provost had a packing-house in New York, on Front Street, near Peck Slip; W. R. Lewis & Bro. established a factory at Portland, Me.; and E. C. Wright began packing oysters in Baltimore, having obtained his knowledge of the process from Thomas Kensett the first. At this time cans were made by the regular tin-workers, but cappers were becoming a regular branch of the business.

Henry Evans, Jr., a tin worker by trade, learned the process while working as a capper for Wells, Miller & Provost. In 1848 he went to Eastport to pack lobsters for that firm; in 1851 going to Baltimore and later engaging with Thomas Kensett the second, who had formed a partnership with Ira Wheeler in New York. In 1849 Evans had a factory at Newark, N. J., for Kensett & Company, and here were packed supplies of fresh vegetables for Dr. Kane's Arctic Expedition. These included tomatoes, onions, potatoes, and cabbage. Some time after this Evans went to the West Indies, where he packed for Kensett & Company the first pineapples ever packed in that way in those islands.

About 1850 the business began to develop rapidly, and its history is difficult to follow. The oyster business of Baltimore and the lobster and sardine fisheries of Maine were the principal bases of extension. William Numsen & Sons began work in this business in Baltimore in 1847; in 1849 they were packing cove oysters. Tomatoes, peaches, pears, and other articles were put up about the same time, the process being applied to nearly all the fresh foods in the different canneries. A number of active New Englanders located in Baltimore, embarking in the raw-oyster shipping business, and in time many of them began hermetically sealing oysters. The widow of Thomas Kensett the first sold the secret to Holt & Maltby and others, and thus they got into the cove-oyster packing. This title of "cove oysters" has come to be recognized as the specific name for hermetically sealed cooked oysters. "Cove" oysters were from coves famous for the size and quality of their oysters, which were located on the west

side of Chesapeake Bay, above the Potomac. The canning business has given them immortality.

For the first half of the century the industry was obliged to produce all the supplies it needed by hand-labor, and even after canneries multiplied the output was necessarily restricted because of the number of hands required and the cost of the goods, based entirely on hand-labor. This industry is the connecting link between agriculture and manufactures, the can being an essential to the foods in this condition; and the food is the *raison d'être* of the can — useless each without the other. The manufacturing lines that have received an impulse from the introduction of this industry are those that unite in the production of the can, the cases, labels, and canning machinery.

Previous to 1850 the cans were made by hand, usually by cutting out the tin blanks with shears, beating the ends into shape with a mallet over a former of some kind, and cutting the opening with a hand-punch and mallet. Originally the opening was covered on the flat top by a flat circular piece of tin, well soldered down. The first can-making machinery we have any authentic record of was naturally adapted from such as tinsmiths used, they being the first providers of cans for the packers, but in 1849 Evans, at Newark, N. J., introduced the use of the "Pendulum" press for making can-tops. This same press came to Baltimore in 1851. With this press Evans introduced the crease and convex cap.

The California gold-fever gave a great impetus to the canning industry, and the list of the new firms that entered the business during the ten years from 1850 to 1860 would be too long to insert here, even if it could be made up with accuracy. Two historic firms arose just previous to the close of the first half of the century — Rumery & Burnham, of Portland, Me., and Louis McMurray, of Baltimore. The former was merged at the close of the war into the firm of Davis, Baxter & Company, a firm then well established. Later, this became the famous Portland Packing Company.

The Civil War gave another impulse to the industry, many of the established firms canning meat on government contracts. The canning of milk, under the title of condensed milk, resulted in a wide extension of the industry as previously carried on. Condensed milk, produced by evaporation and preserved with sugar, became a regular article of commerce; large quantities of it were used by the commissariat of the United States army. In 1860, the New York Condensed Milk Company of New York was in full operation, Mr. Borden being a stockholder of the company. In 1853, William Numsen & Sons of Baltimore were handling such large quantities in this same line that they formed the Baltimore Condensed Milk Company, in which Mr. Borden was also interested. On 4 Nov. 1856, a patent was issued to Gail Borden of New York for this method, and under the same date another for an improved method that dispensed with the boiling.

On 8 April 1862 a patent was issued to I. Winslow of Philadelphia for a new method of preserving green corn, which was the regular Appert process for hermetically sealing goods. Winslow assigned this to J. W. Jones, of Portland, Me. It is understood that Winslow learned this art in France, when on a visit there in 1840. Nathan Winslow, of Portland, Me., is said to have been the first who commercially canned sugar corn, and the Winslow Packing Company has ever since been famous for its canning of this vegetable. There is reason to believe that the industry was first carried into the Mississippi Valley by the same Henry Evans, Jr., who was in Baltimore with Thomas Kensett the second. Evans, who was at that time a member of the firm of Evans, Day & Company, was returning East in 1873, when he happened to stop over at Circleville, Ohio. There he met C. E. Sears, who was engaged in drying sugar-corn, such as is known as shaker corn. He found he could purchase cut corn, fresh and sweet, at a price per can far below the cost of the corn in the husk at Baltimore. His firm bought largely of it that season, besides fitting up a cannery at Circleville to can it there. The next year, however, the cannery was sold to Mr. Sears. This same factory, greatly extended by Mr. Sears, is now owned and operated by his widow, Mrs. C. E. Sears, so successfully that in 1894 she packed the largest output of sugar-corn of any factory in the West, if not in the world.

In the spring of 1864 the business of canning salmon was begun by the firm of Hapgood, Hume & Company, at Washington, Yolo County, Cal., on the Sacramento River. In two years, salmon became scarce there, and after an inspection tour the firm built a cannery at Eagle Cliff, on the Columbia River, Washington. This factory began operations in 1867. The development of the Pacific Northwest was due more to the salmon industry than to any other single influence.

In 1866 G. C. Van Camp, of Indianapolis, Ind., began packing all kinds of fruits and vegetables in six-gallon cans, the goods being sold in the city markets by the pint or quart. In 1868 he went into the regular canning business, mostly in No. 2 cans. G. W. Baker began the canning of sugar-corn in Aberdeen, Harford County, Md., in 1866, and several of his sons still continue in the business.

Between 1877 and 1885 canneries developed in great numbers, Harford County, Md., alone having over 400. At the same time firms spread through all the States of the West, mainly packing sugar-corn and tomatoes. There had been many efforts to introduce machinery into the packing-houses, but it was generally resisted by the employees, led by the cappers, on whom depended the proper sealing of the cans. This important function had been organized into a regular system, one boss capper taking the capping of an entire factory, and, in some places, of several factories. For the sake of having experienced cappers in season the firms would keep them employed in making cans during the winter months, so even the making of cans was largely governed by these employees. Machines to do capping had been invented, but proved to be unpractical until, about 1883, I. H. Cox, of Bridgeton, N. J., introduced a hand-capper which proved a success. Very soon thereafter machines for all kinds of operations in the business were introduced. As machinery multiplied, country canneries increased in number because it supplied the place of hands, which the rural sections lacked. By 1892 the variety of machinery special to this industry had increased to such an extent that in

that year, at an exhibition of canners' supplies held in the city of Chicago, in connection with a convention of the Western Packers' Association, Mr. Buchanan, chief of the Department of Agriculture of the Columbian Exposition, who had been invited to see it, stated to the chief of the Department of Machinery that it was extraordinary and novel. Almost every operation was done by machinery, and the business of "packers' supplies" has become a large one. The introduction of machinery greatly reduced the price of goods and increased the output. Meantime the old, original method of cooking (or processing, as it is called) the goods in open kettles in plain boiling water was improved upon by adding salt to the water to increase its density and thus gain greater heat and quicker results. About 1858 this was further improved by substituting chloride of calcium for the salt; and later, steam-kettles, having a cover and containing a coil of steam-pipe, were patented by A. K. Shriver and G. W. Fisher, both of Baltimore, and these have superseded all other methods for processing foods. Machinery likewise revolutionized the making of cans, until at present they are made by hundreds of millions in special factories, by "systems" that have almost banished the use of manual labor in their production.

The growth of the industry, the multitude of firms, the rapid cheapening of the goods, and the popularity of the business, which requires hermetical sealing and therefore exclusion of the goods from sight, made the fixing of grades and terms of sale and delivery absolutely necessary. Growing in a century from nothing to a vast industry, and peculiar in its nature, it was entirely without commercial rules. The first commercial organization of packers of canned goods met at Philadelphia in October 1872, but had only a brief existence. In February 1883 a Canned Goods Exchange was organized in Baltimore, that city then being the great centre and producer of these goods. A. L. Scott was its first president, and R. Tynes Smith its first secretary. The intention was to have regular sales on the floor daily, but this plan was abandoned. It, however, adopted grades for goods, rules and terms to govern transactions, and laid the foundation of commercial procedure for the business.

In 1885 the packers of the Mississippi Valley organized in Chicago under the title of the Western Canned Goods Packers' Association, with William Ballinger, of Keokuk, Ia., as president, and L. G. Seager, of Gilman, Ia., as secretary, and this has been a successful and powerful influence in the business, under the guidance of wise and tireless officers. It is based on the principle of mutual exchange of private statistics among members. The packers of the State of New York organized about the same year, with T. L. Bunting, of Hamburg, as president, and J. G. Gibson, of Utica, as secretary, with quarterly meetings and the statistical principle. Virginia and New Jersey organized about two years later, each locally.

The basis of a national association was laid at Indianapolis, in February 1889, at a meeting of a number of representatives of the local associations, thus making it of a federal nature; the plan being submitted by Mr. Bunting, of New York. This was consummated at a meeting in Baltimore in May of the same year, by representatives from all the minor associations. L. G. Seager, of Gilman, Ia., was chosen its first president, and E. S. Judge, the publisher of 'Trade,' as secretary. There is nothing of the nature of a trust in the organizations of the packers; they are based entirely on the advantage of mutual information and general business rules.

In 1894 the Peninsula Packers' Association was organized at Dover, Del., with James Wallace as president and C. M. Dashiell, of Princess Anne, Md., as secretary. The "Atlantic States Canned Goods Packers' Association" was also organized in the fall of the same year at Baltimore, with E. H. Thurston, of Mechanic Falls, Me., as president, and H. P. Cannon, of Bridgeville, Del., as secretary. These bodies are also members of the National Association.

In 1900 there were in the United States over 2,000 known canned-goods, packing-firms, distributed among 42 States and operating about 2,200 canneries, of which Maryland had twenty-five per cent; Maine, seven per cent; New York, six per cent; Ohio, Illinois, and Virginia, three and one half per cent each; California, five per cent; Indiana, three per cent, and the other States ranging from fifty-six factories in Pennsylvania down to one in Arizona. The total output of canned goods is computed to have been about 700,000,000 cans of all sizes and kinds. The principal articles packed are tomatoes, corn, milk, oysters, corned beef, salmon, sardines, peaches, peas, beans, apples, pears, pineapples, small fruits, and pumpkins. They are important in about the order given, although values of the aggregate packs may not run in the proportion of the number of cans.

There is a species of sectionalism about the packing, due mainly to climatic influences. Thus, the principal corn-packing States are Maine, New York, Maryland, Illinois, Iowa, and Kansas. Tomatoes are more southern in their trend — New Jersey, Maryland, Indiana, Virginia, and Kentucky being the heaviest packers, while New York, Ohio, and Illinois have the principal milk-canneries. Cove oysters are confined to Maryland, Virginia, North Carolina, Florida, and Mississippi. Beef has been packed in many sections, but the States north and west of the Ohio now almost monopolize this line of canning. Salmon is now only packed on the Pacific coast, and Alaska is the main source of supply for the market, the canneries multiplying there as the fish have fled from the over-fishing of civilization.

Maine monopolizes the American sardine-packing, as it does lobster-packing, except what is done in Canadian waters. Peaches are packed principally in Maryland, Delaware, California, and Michigan; Georgia is, however, annually increasing the number of her canneries of this fruit. Peas are packed principally in Maryland, New York, Ohio, Indiana, and of late in Delaware; but many of the States in the upper Mississippi valley are steadily increasing their output. Beans are of three kinds: string beans, baked beans, and lima beans. The first named are a heavy but profitless pack, being put up in all sections to fill time between other crop seasons; the second have their headquarters in Massachusetts, though New York is a strong second, and the article is being added to the list of packers' products in canning-houses everywhere. Lima beans find most packers in New

York, Maryland, California, and Ohio; the Pacific coast furnishing large quantities that in a mature state come east to be packed in winter as soaked goods. Apples are annually becoming a heavier pack in tin — Maine, New York, Maryland, Ohio, Illinois, Iowa, and Kansas putting up large amounts, and the industry is spreading to the new apple fields of Washington and Oregon. New York and California are the principal packers of pears, Maryland and Delaware also doing much in them. Pineapples, now one of the favorite fruits in tin, are packed mainly at Baltimore, Md., but the packing of them is extending in all directions. Small fruits have declined in the quantity packed till the pack of 1900 was probably not over one fourth the number of cans put up in a year 20 years ago. California is the great packing region for small fruits, but a varying amount is annually put up by canners in all sections. Pumpkin is almost entirely confined to the northern States. Soups are packed principally in New York and Illinois, but the output of this class of goods is being increased by large canneries in several of the other States. There is an almost endless line of varieties of canned goods, from green figs in Mississippi and Texas to turtle in Florida, and dandelions and mince-meat pies in New York.

The annual aggregate values of these goods amounts in an average year to over $82,000,000. Besides the market it has made for the agriculturist, it has made a demand for labor in the cannery and its work, which requires at least 400,000 people in the height of the season. They would require over 2,000,000 boxes of tin-plate for the cans, about 30,000,000 cases, and 700,000,000 labels. Such is the business to-day that 100 years ago had just been shown to the public in a foreign country. The genius of this American republic seized on this idea of the humble Frenchman, and has made of it a great industry and a new article of quotation in the markets of the world. Its vastness is due entirely to the ability of the American workmen to secure and consume the good things of life in all climates and all seasons. See also PACKING INDUSTRY.

E. S. JUDGE,
Sec'y Natl. Assoc. of Canned Food Packers.

Cannizzaro, Stanislao, stän ĭs lä'ō kän-nē-tsä'rō, Italian chemist: b. Palermo, 16 July, 1820. He studied medicine at Palermo, and chemistry at Pisa. In 1848 he was a member of the Sicilian Parliament and had part in the revolution in Sicily. In 1852 he became professor of chemistry in Alessandria; in 1857 in Genoa; in 1860 in Palermo; and in 1870 in Rome. He emphasized by clear definition the difference between atomic and molecular weights, and was one of the most influential in establishing Avogadro's law as a maxim of chemical science. He also discovered benzyl-alcohol and cyanamide. He wrote 'Sunto di un Corso di Filisofia Chemica, e Nota Sulle Condensazioni di Vapore' (1880); 'Relazione Sulle Analisi di Alcune acque Potabili' (1882); and 'Abriss eines Lehrganges der theoretischen Chemie,' which appeared in Ostwald's 'Klassiker der exakten Wissenschaften.'

Can'nock, England, a town in West Staffordshire, seven and one half miles northwest of Walsall, in the district known as Cannock Chase, which is rich in coal and ironstone. Manufactures of boilers, edge-tools, bricks, and tiles, are carried on, and there are numerous collieries. Pop. (1901) 23,992.

Can'non, Frank Jenne, American politician, son of George Q. Cannon (q.v.): b. Salt Lake City, Utah, 25 Jan 1859. He was graduated from the University of Utah in 1878, and has since been engaged in journalism. He was United States senator, 1896–9, and has been prominent as a Silver Republican.

Cannon, George Lyman, American geologist: b. New York, 10 March 1860. He was educated at the University of Colorado and the Colorado State School of Mines, and has been an instructor in geology and biology in the Denver High School from 1887. He has published 'Geology of Denver and Vicinity' (1894); 'Outlines of Geology' (1895); 'Nature Study for Denver Schools' (1895); 'The Protection of Colorado Birds' (1899).

Cannon, George Q., American politician: b. Liverpool, England, 11 Jan. 1827; d. Monterey, Cal., 12 April 1901. He went with his parents to Nanvoo, Ill., in 1844, and was one of the earliest settlers in Salt Lake City. He was a member of the Legislative Council of Utah in 1865–6 and 1869–72, and was a delegate to Congress from 1865 to 1881. At a Constitutional Convention at Salt Lake City in 1872 he was chosen to present the constitution and memorial to Congress for the admission of the Territory into the Union as a State. He translated the 'Book of Mormon' into the Hawaiian language. His son, Frank J. Cannon, was elected one of the first two United States senators from Utah in 1896.

Cannon, Henry White, American bank president: b. Delhi, N. Y., 25 Sept. 1850. He was educated at Delaware Academy in his native town and engaged in banking. He was comptroller of the currency, 1884–5, and was a member of the International Monetary Conference at Brussels in 1892. He is a director of several important railroads and of the Manhattan Trust Company, and president of the Chase National Bank in New York.

Cannon, Joseph G., American politician: b. Guilford, N. C., 7 May 1836. Admitted to the Illinois bar, he was State's attorney of Vermillion County, 1861–8. He was a member of Congress from 1873 to 1891, and again, 1893–1903. He was 20 years on the Committee on Appropriations, and its chairman in the 55th and 56th congresses. He is rugged and unconventional in manner and a ready and fearless debater.

Cannon. See ORDNANCE.

Cannon-ball Tree, a large tree (*Couroupita guianensis*) of the order *Lecythidaceæ,* a native of Guiana, with a hard, woody, globular fruit six or eight inches in diameter — whence the popular name of the tree. It has large white or rose-colored flowers growing in clusters on the stem and branches. The pulp of the fruit is pleasant to eat when fresh.

Cannstadt, kän'stat, **Cannstatt,** or **Kanstatt, Germany,** a town in Würtemberg, in a beautiful and fertile district on the Neckar, two miles northeast of Stuttgart. Its antiquity is proved by the Roman remains found. It has celebrated and much-frequented mineral springs, active and varied industries, including the man-

ufacture of cotton and woolen goods, machinery, etc. Here are also railroad shops and dye works. The Neckar is here crossed by two bridges. Pop. (1900) 26,500.

Cano, kā'nō, **Alonzo,** Spanish painter, sculptor, and architect: b. Granada, 19 March 1601; d. 5 Oct. 1667. He became so distinguished in each of these arts that his countrymen called him the Michael Angelo of Spain, although the title is due more to his versatility than to any resemblance in point of genius to the great Florentine. His 'Conception of the Virgin,' in the church of San Diego, at Granada, is considered his masterpiece. His works in sculpture and architecture are also numerous. He was a contemporary of Velasquez, and in 1639 was appointed court painter to Philip IV. His ungovernable temper on various occasions brought him in danger of the inquisition, and he was once put on the rack on suspicion of having killed his wife in a fit of jealousy, but was subsequently absolved from the charge. On this occasion his right arm was exempted from torture, as being *excellens in arte.* As an illustration of his whimsical character it is related that on his deathbed he refused to take the crucifix from the priest on account of its bad workmanship.

Cano, Juan Sebastian del, hoo-ān' sā-bās'-tē-ān dĕl, Spanish navigator: b. Guetaria, Guipuzoca, about 1460; d. on the Pacific, 4 Aug. 1526. He was one of the first to circumnavigate the globe (1522), as captain of one of Magellan's fleet, which he afterward commanded. In 1525 he was placed second in command of a similar expedition and became its commander by the death of Loaisa.

Cano, Melchior, mĕl'kē-ôr, Spanish theologian: b. Tarrancon, 1523; d. Toledo, 30 Sept. 1560. He was a member of the Dominican order and an opponent of the Jesuits. He was professor at the universities of Alcantara and Salamanca, and was made bishop of the Canaries, but did not live in his see. He wrote 'De Locis Theologicis,' and many other theological works.

Cano y Masas, Leopoldo, lā ō pold o kā'nō ē mā'säs, Spanish poet and dramatist: b. Valladolid, 13 Nov. 1844. He graduated from the Spanish Military Academy at Madrid (1865), and was appointed professor of analytical and descriptive geometry there in 1867, retiring in 1885. His first comedy was 'Laurels of a Poet' (1852). His many other plays include: 'The Code of Honor'; 'Modern Idolatry'; and 'The Death of Lucretia.' He is the author of a volume of poems, entitled 'Arrows.'

Cano'ba, the Indian Apollo, or god of inspiration.

Canoe, ka-noo', a light boat designed for propulsion with a paddle or paddles. The term is very commonly used to designate the small vessels used by uncivilized people living near the water. The name is of West Indian origin, the Carib word being *canáoa.*

Canoes are built in divers forms and of various materials. Doubtless the most primitive form is the hollowed tree-trunk; the excavation, before the advent of adequate cutting-tools, being accomplished by means of fire. This form is of wide distribution, being found in Africa, South and Central America, China, and the islands of the South Pacific and Indian oceans. In the form known as a "dugout" it is common in the United States. Among the island races of the Pacific the stability of the canoe is largely increased by the adoption of an outrigger, which, of varying forms, prevents capsizing on the one side by its weight and leverage, and on the other by its buoyancy. Many of these islanders sew planks together to form their canoes, making the joints watertight by means of gums, etc. Others use double canoes united by a strong platform. Such a vessel is capable of carrying a number of persons and a considerable lading. In South America, where large trees are abundant, very large canoes are constructed. The same is true of Africa, where the war-canoes of the native kings carry very large crews. They are often fantastically carved and ornamented.

As stated above, the propelling force of the canoe is usually the paddle, but sails are often used, particularly on sea-going craft.

The Esquimaux canoe is known as a *kayak.* This consists of a light wooden or bone frame covered with seal-skins sewed together with sinews. The skin covering extends across the top, forming a water-tight deck with but one opening amidships to admit the boatman. A hoop is fitted to this opening, and after the boatman has entered he fastens himself in by means of an apron so that the whole boat is watertight, and he becomes, as it were, part of the craft. So intimate is this union, and so skilful are the Esquimaux in the management of their kayaks, that the boatman can with a twist of his paddle capsize the craft and turn completely around under water, coming up again on the opposite side to that he went over. The paddle is about 10 feet long and double-bladed. The *oomiak,* or women's boat, is also made of seal-skins sewed over a framework; but it is of large, even clumsy build, and but for its propulsion by paddles might be classed as a boat rather than as a canoe. It is designed as a transport for women, children, and household goods rather than for the chase, for which the kayak is principally used.

The Aleuts build large skin boats, somewhat resembling the Esquimaux oomiak, which are propelled by paddles. Such a boat is known as a *bidarkee.* Other tribes of the west coast build large canoes of wood, the war-vessels being, like those of Africa, curiously decorated.

A peculiar form of canoe is found in the Kootenai district and on the Columbia River. While most canoes are constructed with the bow and stern either perpendicular or with a flaring overhang, these Kootenai craft are shaped, both at bow and stern, like the ram of a warship. In other words, the greatest length is along the bottom. These canoes are generally about 15 feet long and are constructed with a light framework of cedar covered with spruce or white-pine bark. This bark is cut off in one piece in the spring, when the sap is running, and is turned inside out, bringing the smooth side in contact with the water. The canoes are sewed with rawhide or tendons, and cracks and knot-holes are stopped with resin. Two squaws will make a canoe in four or five days; the chief difficulty being to get the bark off whole and to turn it wrong side out successfully.

The North American Indians have brought the canoe to its highest state of perfection. With the most frail material, birch bark, they construct a craft so light that it may be carried by one man, and yet so strong and buoyant that it will carry a very considerable load. A framework of light but tough wood is covered with sheets of birch bark, which are sewed together; the seams being waterproofed with resinous gums. They are propelled by means of a single-bladed paddle, which is dipped on one side only (a slight twist correcting the tendency to swerve from a straight line), or alternately on either side. The use of the birch-bark canoe by the Indians of the United States is rapidly becoming a thing of the past; but the art of building them has been preserved by their construction as pleasure-craft.

A form of canoe of recent invention is used solely for pleasure. About 1865 John Macgregor, impelled by a love of adventure, sought recreation on the rivers and fjords of Europe as well as on the waters of Egypt and Palestine. He developed his model from the Esquimaux kayak, and evolved a clinker-built craft of cedar, about 14 feet long and 2 feet in beam, entirely decked over with the exception of a "well" in which the canoeist sits. This is propelled by means of a double-bladed paddle, but a short mast enables the carrying of a sail. In a canoe of this type, which he named the Rob Roy, Macgregor cruised on the Danube, the Jordan, the Nile, the Seine, and on Norwegian fjords. From this early model other forms have been evolved, notably the Nautilus and Shadow types. Water-tight compartments ensure permanent buoyancy. Centre-boards counteract leeway when under sail on a wind. The interior space is so arranged as to provide a sleeping-place for the cruiser.

There are many canoe clubs in the United States, England, and Canada, and the canoe may be seen on all the coastwise and inland waters of those countries, as well as on the continent of Europe.

See article by W. Baden-Powell in the 'Encyclopædia of Sport' (1897); Hicks, 'Yachts, Boats, and Canoes'; Powell, 'Canoe Traveling'; the works of J. Macgregor ("Rob Roy"); Hayward, 'Canoeing with Sail and Paddle'; Field, 'Canvas Canoes.' ELFORD E. TREFFRY.

Canon, Johann, yō'hän kä'nōn, Austrian painter: b. Vienna, 13 March 1829; d. there, 12 Sept. 1885. He entered the Austrian army and in 1848–55 was lieutenant of cuirassiers, but even while in the army had given much attention to painting, and finally devoted his whole time to it. His name first became known through his picture 'The Fishermaiden,' exhibited in 1858. His work includes genre pictures, historical paintings, and portraits; the latter are thought to resemble Rubens or Van Dyck in style. Among his other paintings are 'Cromwell Beside the Corpse of Charles I.'; 'The African Lion Hunt'; 'Flamingo Hunt'; and the 'Fish Market.'

Cañon, or **Can'yon,** in physical geography, a great ravine or gorge; a deep, trench-like river valley with nearly vertical walls. It is the simplest type of river valley and is formed by a young stream in its torrent stage. Thus a cañon is, geologically speaking, of recent date, and is more likely to be found in an arid region than in one of average rainfall, since its growth is due to the down-cutting action of the stream being faster than the general lowering of the land surface by rock-weathering and rain erosion. In southern Arizona, New Mexico, southern Utah, and Colorado, a great plateau 7,000 to 8,000 feet high has been elevated since Tertiary time, as shown by the latest rocks being of Tertiary age. They lie in horizontal strata, and the streams crossing the plateau have cut deep trenches with nearly vertical walls, exposing rocks of all ages down to the basement granite. Here the drainage is several thousand feet below the surface of the plateau. The Grand Cañon of the Colorado is 300 miles long. The average width from rim to rim does not exceed 10 miles throughout the widest portion of the cañon, and it frequently narrows to eight miles. The river does not occupy the middle of the gigantic trough, but flows at a distance varying from one to three miles from the south side. Practically all of the magnificently sculptured pinnacles and so-called temples lie north of the river at distances of from five to seven miles from view-points usually visited by tourists. The depth of the Grand Cañon measured from the south rim is considerably less than a mile. From the rim at the Bright Angel Hotel, where the altitude is 6,866 feet above sea-level, to the high-water mark of the river at the foot of the tourist trail, the drop is 4,430 feet. The highest point on the south rim at the Grand View Hotel is 7,496 feet, about 4,900 feet above the river. From the north side, however, the drop to the water level averages considerably over a mile and in places exceeds 6,000 feet. In a general way it may be said that the north rim is 1,000 to 1,200 feet higher than the south, thus producing the high, even sky-line so impressive to the tourist. It is altogether unlikely that such a chasm could have been carved through similar rocks in a region of average rainfall, as lateral torrents would have greatly widened the valley. Of other cañons and gorges in the Western States may be mentioned the gorge of the Columbia, where it breaks through the lava flows of the Cascade Mountains, 2,500 to 3,000 feet deep. It was eroded in Quaternary time. In California the gorges of the north and south forks of the American River are 2,000 to 3,000 feet deep; the cañon of the Merced River, including the Yosemite valley, is 3,000 to 5,000 feet deep, and the Grand Cañon of King's River 3,000 to 7,000 feet. In some of these cases the stream has cut its way down rapidly enough to form a cañon by following a fault-plane or other line of weakness in the rocks. In parts of the West the word cañon is used very loosely, being applied to almost a ravine or even a gulley.

Can'on (Greek, a rule, measure, or standard). 1. In the arts: When art has succeeded in producing beautiful forms the question arises, with what proportions beauty of form is united. Artists of genius first started this question, and imitators, inferior to them in talents, scrupulously followed their results, and naturally exalted some existing work into a model for every performance. Among the Greeks the celebrated statuary Polycletus (452–12 B.C.) first instituted such inquiries; and as he generally represented youthful, pleasing figures, it is probable that he fixed the standard of beauty in the youthful form. The canon (the model statue) of Polycletus was accordingly a statue which was

made principally for the purpose of showing the beautiful proportions of the human form in a youth just ripening into manhood. No copy of it is known to exist; the artist probably gave his model of proportion a quiet, simple attitude, without any strong distinguishing marks. His successors imitated it without deviation. Polycletus was not the only Greek artist who pursued such investigations respecting the proportions of form. Among the moderns, Dürer and Leonardo da Vinci have devoted themselves to similar inquiries.

2. In Scriptural literature, a term employed to designate the collection of books containing the rule or standard of primitive Christianity; that is, the canonical books of the Holy Scriptures. The canon of the books of the Old Testament, as contained in the Hebrew Bible, receives in this form equal respect among all Christians, because Christ and the apostles have expressly appealed to them, and in this way pronounced them writings inspired by God. There are certain books, however, belonging in subject to the Old Testament, but whose canonical character the Jews did not acknowledge, and which Protestants class together under the head of Apocrypha, and reject from the canon. For these there is only a Greek, and not a Hebrew text. The Western Church accepted them as canonical in the African Council, about the end of the 4th century; but the opinions of the clergy respecting them remained for a long time divided. St. Jerome denied their canonicity, and many theologians coincided with him. The Roman Catholic Church finally declared them canonical in the Council of Trent. (See APOCRYPHA.) Respecting the number of books belonging to the canon of the New Testament, the opinions of Christians were much divided till the 6th century. As early as the 2d century the separation was made into the Evangelicon (the four Evangelists) and the Apostolicon (the Acts and Epistles of the Apostles). The five historical books, the Epistles of Paul, the First Epistle of Peter, and the First Epistle of John were universally acknowledged to be genuine in the 3d century; hence Eusebius, in his 'Ecclesiastical History,' written about 325 A.D., calls them *Homologoumena* (universally received). The other five catholic epistles (Second of Peter, Second and Third of John, Jude, and James) he calls *Antilegomena* (doubtful, not universally received). At that time the Epistle to the Hebrews was considered genuine by most persons, and the Apocalypse by many. These books were received in the second half of the 4th century in the Egyptian Church (where Athanasius first used the term canonical), and in the Western Church. In the Eastern Church, properly so called (the dioceses of the patriarchs of Constantinople, Antioch, and Jerusalem), only the catholic epistles were of canonical authority at that time; the Apocalypse not till the 6th century. The canon of the New Testament has since remained unaltered, and the Protestant churches hold it in common with the Greek and Catholic churches. The results of critical examinations of the genuineness and canonical character of the single books of the Bible, even when they were unfavorable to the books, have produced no alteration in the established canon. The reasons of the ancient fathers of the Church for or against the canonical character of the biblical books were merely historical and traditional, and built on philological criticism; they are still the most tenable and rational; the philosophical grounds are more subject to be affected by extraneous influences.

3. In ecclesiastical use, a rule or law of doctrine or discipline as established by ecclesiastical authority. The term is farther applied to various matters of church organization and ceremony; also to books containing the rules of religious orders, etc., and to a list or catalogue of acknowledged and canonized saints in the Roman Catholic Church.

Another distinctive ecclesiastical use of the term is that which designates a dignitary possessing a prebend, or revenue allotted for the performance of divine service in a cathedral or collegiate church. Canons were originally priests who lived in community, appointed to assist the bishop in his duties, and supported by the revenues of the bishopric. Secular Canons are those who, in progress of time, have left off the custom prevalent in monasteries of living a community life, and have the privilege of enjoying the returns of their respective benefices. The obligations of the canons are contained under three heads: (1) the duty of residing in the place where the church they belong to is situated; (2) assisting at the canonical offices which are celebrated in the church; and (3) attending the meeting of the chapter at the appointed times. They cannot be absent from their benefices for a longer period than three months, and are obliged to sing or recite their office in choir. In their collective capacity they are called a chapter, and form the council of the bishop. In each chapter there are dignitaries. The name was originally applied to all the clergy, but was afterward confined to those who were connected with the cathedral church, or to specially privileged churches.

4. In music, with the ancient Greeks, the term canon signified what now is called monochord. At present it signifies a composition in which the several voices begin at fixed intervals, one after the other, and in which each successive voice sings the strain of the preceding one. In Italian, therefore, it is called fuga di conseguenza; in Latin, canon perpetuus, or continuous fugue; in German, Kreisfuge (circulating fugue). Sometimes each voice begins with the same, sometimes with different notes. The phrase or passage for imitation is called the theme or subject, the imitation the reply. Canons may be finite or infinite. The former end, like any other compositions, with a cadence, while the infinite canon is so contrived that the theme is begun again before the parts which follow are concluded. A canon may consist of two, three, four, or more voices. Canons differ from ordinary fugues; for, in the latter, it is sufficient that the subject be occasionally repeated and imitated according to the laws of counterpoint; but, in the former, it is essential that the subject be strictly repeated by all the succeeding parts; which repetition may be made in the unison or octave, the fourth, or the fifth, or any other interval of the scale. There are several other canons, as canon polymorphus, canon per diminutionem, and canon per augmentationem. Sometimes, also, a musical passage of a composition in which one voice repeats for a short time another, is called, improperly, a canon.

5. In printing, canon is the name given to a large type which is so called from the early use of it for printing the canon of the mass and the Church service-books.

Cañon City, Col., a city and county-seat of Fremont County, situated on the Arkansas River, near the mouth of the Grand Cañon, and on the Denver & R. G., and the Atchison, T. & S. F. R.R.'s. It is a well-known health resort, over 5,000 feet above the sea-level, with an excellent climate and hot and cold mineral springs. In the vicinity there are valuable deposits of limestone, coal, and iron. The river furnishes abundant water-power. Pop. (1900) 3,775.

Canon Finch, Towhee, Wren. See FINCH, TOWHEE, WREN.

Canon Law. Canon law is so named because it consists of rules or canons, which are established to guide the faithful to eternal happiness. In a strict sense, canon law comprises only those laws which emanate from an ecclesiastical authority that has supreme and universal jurisdiction. In a wide sense, it takes in also those laws enacted for the good of the faithful by anyone having ecclesiastical authority. The sources or fountains from which canon law has originated are: Sacred Scripture; divine tradition; laws made by the Apostles; teachings of the Fathers; decrees of the sovereign pontiffs; ecumenical councils; certain congregations of cardinals under orders of the Pope; custom, which, however, could in no case be contrary to divine law, common sense, good manners, public order, or the spirit and the rights of the Church. The Old Testament contains three sorts of precepts, moral, ceremonial, judicial. The moral code remains in full force under canon law; the ceremonial and judicial laws have lapsed. The New Testament is the chief source of ecclesiastical law. It contains also dogmas of faith, but with these canon law does not deal except indirectly. By tradition is meant a doctrine not written by its first author, but conveyed by word of mouth. Usually it is subsequently put into writing. Traditions, considered in their source, are divine or human. Divine are those which have God for their author, and which the apostles received either directly from Christ or by the suggestion of the Holy Ghost. Human traditions are termed apostolic if they originate with the apostles, or ecclesiastical if they come from the successors of the apostles, called bishops of the church. Divine traditions bind all the faithful; human only those of the localities and times to which they are applicable. Some of the enactments attributed to the apostles are: the Apostles' Creed; abstinence from things sacrificed to idols, and from blood and from things strangled, part of which prohibition has lapsed; the substitution of the Sunday for the Sabbath of the Jews; the institution of certain feast days; the fast of Lent. The sentences of the fathers, approved by the Church and made into universal laws by councils or the Roman pontiffs, are part of canon law. These sayings were not inserted in the collection of canons before the 6th century, John Scholasticus being the first to do this in the East in that century, and Regino first in the West in the beginning of the 10th century. To the student it is evident that the constitutions or decrees of the Roman pontiffs constitute the chief source of canon law; in fact, the entire canon law in the strict sense of the term is based upon the legislative authority of the Pope. To understand this it is necessary to recall that in the Catholic doctrine all authority in the Church comes from above, not only in the office of priesthood, but also in the matter of jurisdiction or power of ruling. Catholic writers hold that the primacy or headship in the Church was established by Christ in Peter before the priesthood was conferred on him and the other apostles, the purpose of the Savior being to effect unity in his organization. The church thus organized is a spiritual monarchy; elective it is true, but not an aristocracy or democracy. Other religious organizations hold quite the opposite doctrine and would make their unity be a coalition of equal parts. This point of primacy of the Roman pontiff is also the line of separation between the canon law of the west and that of the separated Greek and the Russian churches, the review of which is given later in this article. Ecumenical councils, whose decrees are a source of canon law, are those meetings of the bishops of the church throughout the world, which are held under the presidency of the pope or his legates, and whose acts are by him confirmed. There are twenty councils recognized as ecumenic; the first being that of Nicæa in 325; the latest that of the Vatican in 1870.

During the first three centuries, the church was administered according to the scriptures only and the rules laid down by the apostles and bishops, as occasion required. Thus Clement, the disciple and successor of Peter, mentions the rule given by the apostles concerning the succession of bishops, and Ignatius the Martyr, in his epistles, exhorts his followers to diligently and tenaciously observe the traditions of the apostles. Thus, too, in the controversy concerning the celebration of Easter, the contestants on each side alleged the apostolic tradition. But councils were held at Ancyra and Neo-Cesaræa in 314, at Nicæa in 325, at Antioch in 322, at Sardica in 347, at Gangra from 362 to 370, at Laodicæa between 337 and 381, at Constantinople in 381, at Ephesus in 431, and in the council of Chalcedon in 451 a collection of canons made up from these previous councils was read and partly authorized for the entire church. With the exception of those of Sardica, which are in Latin, the canons of all these early councils were formulated in Greek. The name of the compiler of this first collection is unknown and few of these early canons have reached our times, only their tenor being known through subsequent use in the western church, especially in Spain. After the emperors assumed the Christian religion, ecclesiastical legislation became important, and the laws of the church were therefore in the year 438 inserted in his collection by the emperor Theodosius II. Valentinian III. afterwards adopted this collection for the West. About this time — the latter half of the 5th century — a compilation was made of the so-called apostolic canons and constitutions together with decrees of some of the councils. Originally there were 50 canons called apostolic, but their number was afterwards increased to 85, some of which are certainly spurious. In the East these were received as having the stamp of authority, but not so in the West, where their origin was doubted. However, Dionysius adopted the smaller collection of 50,

considering them useful for discipline, and thereby without determining their origin procured for them in Rome the stamp of authority. John Scholasticus made a collection of canons for the Greek church in 564, to which he added 68 canons taken from Saint Basil. He divided the work into 50 titles. To this he later added the laws of the empire which had relation to the laws of the church, and the new compilation became known as Nomo-canon. The emperor Justinian II. in 692 assembled a council in his palace at Constantinople, called the Trullan Council from the room in which it was held, and 102 canons were enacted. When the acts and canons of this council were submitted to Pope Sergius at Rome for approval he refused even though the emperor ordered his armor-bearer to bring the Pope to Constantinople. The Trullan compilation consisted of the so-called Canons of the Apostles, those of the ten councils previously mentioned, the canons of the synod of Carthage, the decrees of a synod in 394 at Constantinople under Nectarius, the canonical decisions of the twelve Eastern patriarchs and of some bishops from the 3d to the 5th centuries, the canon of a council held at Carthage under Cyprian in 256, to all of which were added the 102 canons drawn up by the Trullan council itself. Afterwards 22 canons of the second council of Nicæa held in 787 were added. On this foundation the church law of the East was based up to the middle of the 9th century. By the Trullan synod, priests were allowed to marry, which up to that time was against the canon law of both the Eastern and the Western church. The Trullan synod also sanctioned the Canons of the Apostles, one of which teaches the doctrine of the re-baptisers, which had been previously repudiated by Pope Gelasius. Herein is noticed the first real divergence between Eastern and Western canon law. Photius, who was intruded into the see of Constantinople, called a council against the patriarch Ignatius in 861, and 17 canons made by this council were added to the codex of the Greek church. He also formulated a new collection, in which the second part, called the Nomo-canon remained unchanged. The emperor Leo the Philosopher, who deposed Photius, rescinded his collection of laws, but nevertheless the seeds of the separation of the Greek church from that of Rome had been implanted by the work, although a complete schism took place only later in 1054 under Michael Cerularius. From time to time new ecclesiastical constitutions issued from the emperors, as from Leo Philosophus in 911, from Constantine Porphyrogenitus in 961, from Alexius Commenus in 1118, from Isaac Alexius in 1185–90. The resolutions of synods summoned by the patriarchs of Constantinople, epistles of renowned bishops and their decisions, formed another addition to the canon law of the eastern church. The first commentary on the Greek codex was undertaken by Theodore Prodromos in the 8th century. The second, containing the text with a commentary, is the Nomo-canon of Doropater. The monk John Zonares composed a comprehensive verbal interpretation in 1120, using the collection of Photius as a basis. Fifty years later, Theodore Balsamon made a commentary with a view to practical questions, comparing the canons with the civil law and insisting that Justinian's maxims only applied when comformable to the Basilics. He added many matters not found in the collection of Photius. Epitomes of canon law were composed at a comparatively early period, the author of the first of which appears to have been Stephen of Ephesus in the 5th century. There is a synopsis by Aristenus augmented by Alexius Aristenus in 1160, and another by Arsenius, a monk of Mount Athos, in 1255. Constantine Harmenopoulos in 1350 composed an epitome of the spiritual law in six parts, using, with some omissions, the collection of Photius as altered by Zonares. In order to reduce canon law to a more practical form than it appeared in the collection of Photius and at the same time present a more comprehensive work than these epitomes, Matthæus Blastares drew up his syntagma in 1335, divided into chapters of different lengths and arranged according to the principal word of these rubrics, the numbers of the chapters commencing anew under each letter. Each chapter begins with the ecclesiastical law, followed by the civil law applicable to it, without, however, mentioning the source of the latter. This work came into very general use among the clergy. The collection of Photius and the syntagma of Blastares continued still in use under the Turkish rule and were alike termed Nomo-canon and, metaphorically, the 'Rudder.' The collection and interpretation of Zonares also obtained canonical authority. From these materials many extracts were translated into modern Greek up to the 18th century, and several text books composed for the use of the clergy, some of which were printed in Venice. Lastly a comprehensive collection was published in 1800 at the instance of the patriarch and synod. It contains the old Greek text of all the authentic canons of councils since Photius and Zonares, to which are added interpretations of the authentic commentators in modern Greek, especially those of Zonares and Balsamon. In the interpretation, the canons of those fathers are taken into account which had not been confirmed by any general synod, but had obtained a canonical authority. Nothing was inserted from the municipal law works which did not agree with the canons. Several appendices were added, including formulas for ecclesiastical business, and upon these and similar collections is founded the present law of the Greek separate church. The Russian followed the Greek church in adopting compilations of church law up to the end of the 15th century. In 1550 certain regulations respecting the jurisdiction of bishops were introduced. Some canonical epistles and rules drawn up at councils are used in addition to the Greek codex, and manuals adapted to the country have been compiled therefrom. Peter the Great in 1721 changed the chief executive authority in the church from a patriarch into the Holy Synod, by decrees of which the church to-day is ruled. By an arrangement lately made with the Roman pontiff the bishops and priests under Roman jurisdiction are ruled by the canon law of Rome, subject to the civil laws of the Russian Empire, and to prevent complications, Russia, besides a resident minister and two secretaries, has at the Vatican a representative agent for ecclesiastical affairs.

In the Western or Latin Church the canons of Nicæa and Sardica were the only code publicly received up to the end of the 5th century. About this time the Spanish translation of the Greek code was turned into barbarous Latin,

and became known as the Prisca. The decretals of the Roman pontiffs were added to the canons of the Greek code, as found in the Prisca, but it seems that Dionysius the Little, about the year 500, was the first to formulate a collection of the councils and the decretals. He had previously made a collection of the concilia for Stephen, the bishop of Dalmatia. The deacon Theodosius later made a new collection founded on the old Spanish and the Dionysian. A third collection termed the Avellanian, valuable for the historical documents it contains, appeared in the latter half of the 6th century. These, however, were superseded by a second edition of Dionysius, made probably in 731 under Pope Gregory II. In this edition some decrees overlooked previously were added, together with an appendix consisting of the statutes of the Roman pontiffs from Linus downwards, those up to Sericius, however, being given only in an historical form as no longer actually in existence. The German conquerors of Italy in 476 did not, although Arian, interfere with the laws by which the church was governed, but when Justinian reconquered Italy he introduced his Novellæ in the Julian translation in place of the codex of Theodosius II., and this order of things was later upheld by the Lombard kings in their edicts. In Africa the deacon Fulgentius Farrandus made the first collection in 547, termed Breviatio. This was an excerpt in 232 numbers of nearly all the Greek canons, including the Nicæan, to which was added the African concilia under Gratus in 348–9, under Genethlius in 390, and that of Carthage in 419 with its 33 canons, together with 304 taken from synods as well as an extract from the canons framed at Hippo in 393. The second African work was the Concordia of Bishop Cresconius in 690, founded upon Dionysius, but arranged in 300 titles instead of in chronological order. This work was incorporated with Dionysius and appeared under the name Breviarium. But the Arabs now put a sudden stop to all further development of canon law in this quarter. As early as the 5th century, as noted above, there was in Spain a translation of the Greek canons; in the 6th century Martin of Braga made a collection of canons, but in the 7th century Isadore of Seville held two councils, half church, half civil, the canons of which may be said almost to have formed the basis of the constitutional law of Spain in both church and state down to the 15th century. The collection of canons known as Collectio Isadoriana or Hispana was divided into two parts; the first containing the classified series of Greek, African, Frankist and Spanish canons, and the second the decretals from Pope Damasus in 366 to Gregory the Great in 604. In the 5th century an extensive but confused collection of councils and decretals was compiled in Gaul under Gelasius. It was founded upon the old Spanish version and some peculiar version of the canons of Nicæa and the Prisca. Out of it sprung several other collections; the first in the middle of the 6th century, containing the councils of Nicæa, and of Sardica, some Frankist concilia and papal decretals; the second of the same date containing Greek, African, and Gallic canons, and papal decretals in a confused order; the third in the 7th century, containing 103 numbers, many decretals, Frankist, Roman, and Italian concilia. A fourth and a fifth collection of the same century contained chiefly Frankist and Spanish conciliar decrees. After Charlemagne in 774 on his first visit to Rome had received from Pope Hadrian a copy of the Dionysian collection with some additions, he had it sanctioned in a synod at Aix-la-Chapelle as the *codex canonum* for the Frankist empire. In addition to these principal works many of the bishops composed capitularies for their own dioceses, as Boniface of Mayence, Theodulph of Orleans, Hincmar of Rheims. The 'Hispana' circulated among the Franks in a more or less corrupt form. One edition, which appeared between the years of 829 and 857, has caused great controversy, and is known as 'Collectio Pseudo-Isadoriana,' or False Decretals. The author called himself Isadore Mercator, and the name led many to believe the work that of Isadore of Seville. The best evidence shows that Levites Benedict of Mainz was the compiler, but no purpose for the forgeries in the work has been conclusively shown. After the preface and some minor apocryphal documents, the first part contains 50 of the apostolic canons taken from 'Hispana' and 60 supposed decretals of the popes from Clement in 92 to Melchiades in 314, arranged chronologically. The second part consists chiefly of canons taken from the 'Hispana.' In the third part, founded also on the 'Hispana,' the compiler has interpolated 35 decretals. A supplement contains some brief regulations regarding processes against bishops, said to be by Capitula Angilramni, a bishop of Metz. The collection was regarded as genuine by all canonists and theologians for 700 years from the 9th to the 15th century. Cardinal Nicholas of Cusa in the 15th century first expressed doubts of the genuineness of some of its contents. In the following century religious bitterness overshadowed scholarly inquiry, but it is now admitted by Protestant writers that the compilation was produced, not in the interest of the pope but of the Frankist bishops in order to protect themselves against oppression by temporal rulers on the one hand and church councils on the other. For this reason such insistence is found in the collection on the right of appeal to the pope in every major cause of a bishop and also that the pope's permission is necessary to the holding of a provincial synod. The sources from which the compiler chiefly borrowed his materials were the Bible, the fathers, genuine canons and decretals, Roman law, the works of Rufinus and Cassiodorus on church history and the lives of the popes in 'Liber Pontificalis.' Of the supposed decretals a large number are authentic although antedated and ascribed to earlier popes to give them the value of antiquity, while others embody the traditional contents of actual but lost decretals. The influence of the pseudo-Isadorian collection has been much exaggerated for it wrought no material change either in the faith or the discipline of the church, since it merely put into enactments the prevailing ideas and doctrines of that period on church government. Had it introduced a violent change the innovation would have caused a speedy inquiry into the genuineness of the work. However, it cannot be doubted that a written text often in controversy is a more forcible argument than traditional law, and hence the false decretals naturally exerted some influence.

To meet the necessity of rendering canon law more accessible from the 10th to the 12th

century at least 36 compilations were made, only the authors, titles and dates of which seem necessary for this article. The first was a manuscript under twelve heads, divided into 354 chapters, abstracted from Cresconius. The second was extracted from Dionysius and the pseudo-Isadore collection. The third is very voluminous, and taken from Hadrian's codex with numerous additions. The fourth, by an unknown author, contains portions of concilia, decretals, and extracts from the Fathers. The fifth, made by Regino, abbott of Prum, between 906 and 915, is founded on three Frankist collections, the Fathers and the West Gothic Breviary. The sixth is a Leipsic codex; the seventh a Darmstadt codex. The eighth is attributed to Rotger, Bishop of Treves in 922. The ninth is a Viennese manuscript. The tenth is also a manuscript of five books, composed in Italy in the middle of the 10th century, and is founded upon the Irish collection in 65 titles, on fragments of the Fathers, lives of the saints, decretals, Julian's 'Novellae,' with capitularies of the emperors added up to Henry I. The eleventh was addressed by Abbo, abbot of Fleury, to King Hugo and his son Robert, and consists of a treatise of 52 chapters on the church and clergy. The twelfth was composed by Burchard, bishop of Worms, in 1012–23, and contains the canons of the apostles, the transmarine, German, Gallic and Spanish councils, papal decrees, and other passages. The 13th is a manuscript in 12 books made in Germany or France. The 14th is a Terraconian manuscript belonging to the 11th century. The 15th is an introduction to discipline. The 16th is a collection taken chiefly from Halitgar, Rasbanu, Maurus and Burchard. The 17th is a rich collection in manuscript by Anselm, bishop of Lucca in 1086. The 18th is 74 titles taken from the above work, and the 19th and 20th appeared about the end of the 11th century, both taken from the works of Anselm and Burchard. The 21st is a work in 13 books. The 22d is the capitularies of Cardinal Atto in 1081 and excerpts from decretals. Cardinal Deusdedit composed the 23d in 4 books, at the end of the 11th century, from Dionysius, the Greek canons, the old Italian and Spanish-Saxon and Roman records. The 24th is by Bourgo, bishop of Satrim in 1089, and is in 10 books. The 25th is in two books and belongs to the 11th or the 12th century. The first chapter is inscribed from the Primate of the Roman church and is published with the Dionysian collection. The 26th is the decree attributed to Ivo, bishop of Chartres, and the 27th is the Pannormia in eight parts by the same author in 1090. The 28th is a large manuscript collection; first of decretals, second of councils, third of fathers, then Roman and Frank legal collections. The 29th was made under Pascal II. in 1102–18 in seven books. The 30th is attributed to Hildebert, bishop of Tours, in 1134, and may be the same as the ten books attributed to Ivo. The 31st is a manuscript in 15 books called the collection of Saragossa. The 32d is wholly extracted from the above. The 33d is taken from Burchard and Ivo. The 34th is a penitential book in nine titles belonging to the 12th century. The 35th belongs to the middle of the 12th century and is taken chiefly from Anselm of Lucca and the collection dedicated to Anselmus. Gregory, a Spanish priest, is the author. Lastly, Algerius of Liege in the beginning of the 12th century compiled a work on 'Justice and Mercy,' which contains a treatise on church discipline in three parts, taken from Anselm and Burchard for the most part. Gratian, a Benedictine monk, composed at Bologna in the middle of the 12th century a scientific and practical work on the canon law with references and proofs. The first part treated of ecclesiastical administration, the second contained 26 legal positions, with their answers, the third part concerned the liturgy of the church. The whole work is founded on previous collections and contains many mistakes. It was never approved by the church though it obtained great authority and superseded all other collections. Other collections are by Cardinal Laborans in 1182, that of Bernard of Pavia in 1190, that by Gilbert, an Englishman, in 1203. The universities of Bologna and Paris at an early period began to exercise great influence on canon law and their opinion in controverted questions was considered decisive, and was termed the authority of the schools. Gratian's collection was made the basis of lectures in Bologna and teachers of the canons were called *magistri* and *doctores decretorum*. Their teachings were soon gathered together in books of commentaries. Soon after the collection by Gratian, the Extravagantes, or decrees not yet collected, were gathered together, there being between the years 1179 and 1227 14 different compilations, only five of which received the stamp of authority. Pope Gregory IX. ordered a code to be published in which the entire body of law should be properly arranged. What was useless should be cut out, what was ambiguous should be corrected. Raymond of Pennafort was intrusted with this task, which he finished in the year 1233, and the collection was sent to the universities of Bologna and Paris with instructions that it was to be the sole authority. The whole work is divided into five books. The first treats of ecclesiastical judicature and of prelates; the second of civil suits; the third of civil causes before the episcopal forum; the fourth of betrothals and marriage; the fifth of judicial proceedings in criminal matters and of punishments. To these five books was added by Pope Boniface VIII., in 1298, a sixth book of decretals. This was followed in 1334 by the Clementinæ or collection of decretals by Pope Clement V. The Extravagantes of John XXII. in 1334 and the Extravagantes Communes (73 decretals from Boniface VIII. to Sixtus V.) were gathered by authority and made part of the code or 'Corpus Juris Canonici.' Commentaries on the 'Corpus' were made by the doctors, and systematic works for the use of courts were published. In the 15th century legal literature seems confined to these efforts. But in the 16th century Pope Paul IV. confided to a congregation of cardinals, with canonists as consultors, the work of revising and correcting the 'Corpus Juris.' Gregory XIII. approved the work of the committee and an authentic edition was published in 1580, in which the glosses are retained, and on which all subsequent editions have been based. The corrections made by the commission are marked «*cor. Rom.*» in the text. Two appendices were added, one the Institutiones Lancelotti, the other Septimus Decretalium, which contained the Extravagantes to Sixtus V. in 1590. Neither is of public authority, but both are very useful and recognized

by scholastic approval. Since then the Bullarium Benedicti XIV., which contains the constitutions of that pope, has been made of public authority. There is also a collection of papal bulls, called Bullarium Magnum Romanum, made up in 14 volumes, which was published in 1744 and continued in 1840; but it is very imperfect and only a private collection. Anyone who desires to know canon law must learn the 'Corpus Juris,' even though to-day many parts have been changed by the councils of Trent and the Vatican and by new papal decrees. In the 'Corpus' itself the different portions stand as *lex prior* and *lex posterior,* so that in cases of contradiction the latest is preferred. With certain modifications the 'Corpus' still has the force of law in matters relating to ecclesiastical judicature, to divine worship, to doctrine and discipline. It is the code still followed in the schools and used in church courts, not only as the source of argument but also as the method of procedure in many cases. The 'Jus Novissimum' in canon law consists of laws published from the time the 'Corpus Juris' was closed, that is, since the Extravagantes were inserted down to the present day, and includes the decrees of the councils of Trent and the Vatican. Except the Bullarium of Benedict XIV., mentioned above, no authentic collection has been made of the various constitutions and laws made by the Roman pontiffs since the close of the 'Corpus.' Still every genuine decretal is part of the canon law. The same may be said of the decisions of certain congregations of cardinals which have the force of law, especially that of the Council which authoritatively interprets the decrees of the Council of Trent. So evident was the need of a revision of canon law that at the ecumenic Vatican Council, held in 1870, proposals were made by a number of bishops to have a committee appointed, consisting of the most eminent canonists, to revise the 'Corpus Juris' or rather prepare a new one, omitting whatever owing to changed times was no longer applicable. Nothing was done before the adjournment of that council, but Pope Pius X. by a *motu proprio* in the year 1904 appointed a special committee of cardinals, with a number of consultors, and a canonist from each nation, to thoroughly revise not only the 'Corpus Juris' but all the canon law of the church, that general for the world and that special to the various nations. He himself is president of the committee to which he assigned the following cardinals: Seraphin Vanutelli, Agliardi, Vincent Vanutelli, Satolli, Rampolla, Gotti, Ferrata, Cassetta, Mathieu, Gennari, Cavicchioni, Merry del Val, Steinhuber, Segna, Vives y Tuto, and Cavagnis. Archbishop Gasparri was appointed secretary. At least five years will be consumed in the work, and the code thus established will hereafter be the only authorized canon law of the Latin church.

It will have been noticed that canon law is not traceable to any original code, but is a development founded on the general moral rules laid down in the Scriptures and especially in the New Testament. Neither is the Roman civil law traceable to any code, but is a gathering of principles suggested by good reasoning for promoting the civil interests of its subjects. Compared to the Jewish law, the principle upon which Roman jurisprudence was founded was very different — the former treats principally of criminal matters and is most severe in its penalties; the latter on the contrary, treats all questions as civil, and prefers restitution to punishment. When the Roman emperors had been converted to Christianity, in promoting its progress by special constitutions which then became part of the canon law, they necessarily gave to canon law much of the spirit of their civil law. Thus it happens that in the canon, as in the Roman civil law, there was little severity in criminal matters, and many cases which other peoples than the Romans treated as criminal were cognizable by a civil tribunal and an indemnification was effected by damages. Generally no crime was punished capitally, especially where no force or violence was employed. This spirit of leniency is manifest throughout canon law to the present day. During and after the 4th century wherever Roman power conquered the nations and wherever Christian missionaries converted the pagans canon law was introduced through the influence of the pope and the emperor. It permeated and modified the laws of the peoples of northern Europe, as well as those of England to a certain extent. With it necessarily came the principles of Roman civil law. The rules for the application of canon law were as follows: (1) In cases not contained in the civil law, or the rule for which was obscure, open to doubtful interpretation, or not expressly determined, if expressly and clearly resolved by the canon law, this latter formed the basis of the decision; and on the contrary, if the case was not provided for, or ambiguously resolved by canon law, when it was expressly met or its solution more clearly indicated by the civil law, this latter was to be preferred. (2) In cases of conflict, the civil law formed the rule for courts of civil, and the canon in those of ecclesiastical jurisdiction. Thus, when a matter of canon law cognizance arose in the civil courts the decision was given according to the rules of the canon law; and *vice versa,* when a question of civil cognizance occurred before an ecclesiastical tribunal. (3) Within the imperial states the civil law formed the basis, and the canon law in the papal states. (4) In matters of a feudal nature the civil was preferred to the canon law. (5) In forensic causes the canon is not presumed to differ from the civil law. When the Western empire passed under the rule of a barbarian race the Roman and the canon law were not only preserved, but to a great extent they influenced the legislation of the conquerors. Alaric, Attila, Ricimir did not disturb the outward form of Roman government. In the collection of west Gothic laws, gathered in 672 A.D., there are evident traces of the part which the Roman clergy took in the compilation. The Burgundian laws also show literal excerpts from the Roman law. Roman law is found also in the Bavarian code composed in the 7th century, as well as in the capitularies of the Franks, which commence in the year 560 and are introduced by a literal transcript of a novel of Valentinian. It is noteworthy that the German tribes did not force their laws upon their subjects in those portions of their conquests where the Roman law was acknowledged. It was natural, too, that the churches, as juristical persons, should follow the Roman law, not only on account of its connection with religion and the great degree of favor it manifested toward the Church, but

also of the accuracy of its provisions in this respect. Like the law of the Teutonic tribes, that of England is an accumulation of individual laws. While Britain was conquered by Julius Cæsar in 54 B.C., still it was only at the end of the 1st century of the Christian era that Roman manners, arts, architecture, language, and laws were introduced. The Roman law superseded the customary laws of the island and remained in force until the year 455, when Britain became derelict because of the removal of the seat of empire to Constantinople and the impossibility of the emperors defending it against the Picts and Scots. Christianity was introduced into Britain under the Roman dominion and was preached in Scotland and Ireland before the year 430. Roman literature, arts, and law, however, received a sudden check by the Saxons, who, when they invaded Britain, imposed their law upon the conquered people. The Danes subsequently did the same. Still we are informed by the Venerable Bede that Ethelbert, king of Kent, in 613, with the assistance of his wise men, made certain decrees and gave judgments between his subjects in conformity with the principles of Roman and canon law, at least so far as regarded sacrilege, bishops, and the like. Indeed, it is not surprising that the Saxons and Danes, whose codes contained a great admixture of Roman law, should carry the same principles with them into their new settlement in England. Traces of a Roman original may be seen in the laws of Ina, king of the West Saxons, Offa, king of the East Angles, and in the laws published by Canute which were translated into Latin. Thus it happened that, when Edward the Confessor compiled a code out of the materials then at hand, much of the Roman and canon law was inserted and thus became the basis of much of the common law of England and the United States. During the dominion of the Saxons and Danes, those Britons who had fled to Wales were governed by their own princes. Howel Dha, in 940, is said to have assembled his bishops and the more literate among the laity for the purpose of revising the law which was translated into Latin at his command. In the 85th article he approves the Roman rule of two witnesses being sufficient in cases where no specific number is stated, and for holding the testimony of one to be insufficient, except of a woman in cases of rape, of a lord between two tenants, an abbot between two monks, a father between two of his children, a priest in a matter attested in his presence, and a thief turning king's evidence in the place of execution. Most of the Roman laws of this age seem to have been taken from the Theodosian code. Although the foot of the Roman soldier never trod on the bosom of Ireland, nor did a Roman general have a chance to introduce the Roman law, still the principles of canon law were enforced throughout Ireland and Scotland by Saint Patrick in his canons. One of them, translated by the Anglican Bishop Usher, reads: "Wherever any cause that is very difficult and unknown to all the judges of the Scottish nation shall arise, it is rightly to be referred to the see of the archbishop of the Irish (that is, of Saint Patrick) and to the examination of the prelate thereof. But if there, by him and his wise men, a cause of this nature cannot easily be made up, we have decreed it shall be sent to the see Apostolic, that is, to the chair of the Apostle Peter, which hath authority of the city of Rome."

In 680, at the command of Ethelred, Egfrid, king of Northumberland, Aldwulf, king of the East Angles, and Lother, king of Kent, Theodore, at that time archbishop of Canterbury, summoned a synod at Hatfield, in which the canons of the five general councils of Nicæa, Constantinople, Ephesus, Chalcedon, the second of Constantinople, were enforced, together with the Concilia drawn up under Pope Martin at Rome in 648. He also collected in his capitularies the most important points of church discipline. Later he wrote his 'Book of Penances.' In the latter half of the 8th century, Egbert of York made an extensive collection of canon law from the sources then existing. He also wrote the book 'De Remediis Peccatorum.' In the 8th century a collection was made in Ireland in which the Dionysian collection and Roman, Gallic, and Irish councils are used. King Henry I., in 1100, endeavored to repudiate a number of church laws and ordered that Peter's Pence was to be paid to the king instead of the Pope. Henry II. entered into a controversy over the enforcement of canon law with Thomas à Becket. In 1215, by the Magna Charta, King John confirmed to the prelates and barons of his kingdom the freedom of election of the clergy, and this acted as a general acknowledgment of ecclesiastical rights and liberties. In 1230, Otho, the legate of Pope Gregory IX., held a national synod, and in 1268 Othobon, the legate of Pope Clement IV., held a second, both of which, as Blackstone says, had a great effect on the ecclesiastical jurisprudence of England. Under King Henry III., Boniface, archbishop of Canterbury, enacted several canons which seemed against the existing laws of the realm, and under Stephen an ecclesiastical and a secular party were formed, the latter adhering to the common law as tenaciously as the clergy and nobility did to the canon and civil law. In the parliament of Merton, however, the adherents of the canon and civil law were defeated on the proposition to make *legitimatio per subsequens matrimonium* legal also in England as it was under canon and civil law. Under Richard II., more than 100 years later, the feud still existed. Anglo-canon law was further augmented by the decrees of provincial councils held under the archbishops of Canterbury, from Stephen Langton to Henry Chichiley, which were glossed by William Lindwood, and later enforced also by the archbishops of York. The kings meantime had also enacted many statutes on the relations between secular and ecclesiastical jurisdiction. A statute of Henry VIII. rendered void all canons which were contrary to the law of the realm or hurtful to the royal prerogatives, and provided a commission to revise them. Edward VI. renewed the commission, but the code was not confirmed before his death. Mary repealed all these acts, but Elizabeth revived the first act of Henry VIII. In 1603 some canons were made in the convocation of the province of Canterbury and confirmed by the king but not by Parliament. It is held that, therefore, these bind the clergy in church matters, but not the laity, except in so far as not repugnant to the laws of the realm. By acts of Parliament (26 Henry VIII., 1; 35 Henry VIII., 3; 1 Elizabeth, 1) the king was declared the supreme head of

the Church, and it became treason (1 Ed. VI., 12; 5 Eliz., 1) to doubt it or to defend the supremacy of the Pope as head of the Church. These acts and subsequent ones reversed canon law in England, Ireland, and Scotland. Speaking of the courts of the archbishops and bishops of the English Church to-day, Blackstone says: "An appeal lies from all these courts to the sovereign in the last resort, which proves that the jurisdiction exercised in them is derived from the crown of England. . . . It appears beyond a doubt that the civil and canon laws, though admitted in some cases by custom in some courts, are only subordinate and *leges sub graviori lege*. They are by no means with us a distinct, independent species of law, but are inferior branches of the customary or unwritten laws of England." In Scotland many of the provisions of canon law became the law of the land. During the 16th and 17th centuries canon law was taught in the Scottish universities, and from very early times many of the youths of Scotland attended the schools of the Continent, whence not a few returned as doctors *in utroque jure*, that is, canon and civil law. The canons of provincial councils, held yearly, and at whose meetings representatives of the king were present, constituted a national canon law which was recognized by the Pope and by Parliament and enforced in the courts of law. Even to this day, though the ecclesiastical system of the country is Presbyterian, the old canon law still prevails to a certain extent. "So deep hath this canon law been rooted," says Lord Stair in his 'Institutes of the Law of Scotland,' "that even where the Pope's authority is rejected yet consideration must be had to these laws, not only as those by which the Church benefices have been erected and ordered, but as likewise containing many equitable and profitable laws which, because of their weighty matter and their once being received, may more fitly be retained than rejected." In two old acts of the Scotch Parliament, made in 1540 and 1551, the canon and Roman law are mentioned as the common law of the country, the clause used being "the common law, baith canon, civil and statutes of the realme." Since the restoration of the Catholic hierarchy in England in 1850, and in Scotland in 1878, the churches under Roman jurisdiction have held various councils and enacted laws to fit the changed conditions. These laws, having been examined by the committee of cardinals in Rome appointed for such purpose, have become, as it were, a national canon law for the Catholics of those countries. In a similar way the Catholics of newly established nations, owing to various reasons, are ruled by a modified canon law which gives the bishops and superiors a very extensive authority. Such is the case at present in Canada, Australia, and the United States. These modifications pertain chiefly to the election of bishops, the appointment and removal of parish clergy, the tenure and administration of church property. The second and third plenary councils of Baltimore contain special modifications for the United States. For Canada a preparatory meeting for a plenary council was held in 1903 under the presidency of the apostolic delegate. For Mexico, West Indies, and South America a council was held in Rome of the bishops of those countries, and its decrees were published in 1901. Other national modifications of canon law in the course of time have been introduced by concordats made by the Pope with the rulers of Christian nations by which he grants them certain concessions. As a nation Spain enjoys the greatest concessions, France up to the present coming next. The councils held in Gaul in the 4th and following centuries show the beginning of a national canon law for France. The fourth canon of the Council of Arles, convoked by King Clovis in 511, prohibited certain laymen and teachers from receiving holy orders without the king's consent. The Council of Orleans, in 549, shows that at that time the king's consent was necessary for the election of bishops. Many points regarding a special liturgy, the administration of the sacraments, the matter and forms of ecclesiastical trials are to be found in these same early councils. The laws of Dagobert, in 620, show special protection given the Church but also lay the foundation for future subjection; for councils could not be held without consent of the king, and bishops were elected not unfrequently at the dictation of royalty. But the capitularies of Charlemagne and his successors, collected in 825 by the abbot Ansegiso, were very favorable to the Church. Under the third dynasty, especially because of the feudal law, bishops, abbots, and chapters exercised almost complete civil authority over the people in their charge; but the oath of fealty was imposed on the prelates as vassals of the king. On the other hand, the kings took upon themselves the defense and guardianship of the Church, and on the pretext that at the death of the prelate they were the guardians of the vacant see, they performed many acts of ecclesiastical jurisdiction, among which was the administration of the temporalities of the vacant church. This was not done, however, without the assent of the sovereign pontiffs. Herein is found the origin of *jus Regaliæ* which later caused such trouble. In the year 1268 a pragmatic sanction was issued by Saint Louis which gave liberty of election of bishops and ordered that the general canon law should be observed throughout France. However, the genuineness of this law has been seriously questioned. Under Philip the Fair the seeds of absolute independence of the secular from the spiritual authority were sown; and about the same time serious contests arose between clerical and lay judges concerning their jurisdiction. On appeal to the king the clergy won; but the jurisdiction of the Church was gradually lessened, and at this time the appeal "as from abuse" was introduced, that is, a clergyman might appeal to the king from an abuse of the power exercised by a bishop. This was diametrically opposed to general canon law. The great schism of the West brought out the question whether the Pope or an ecumenical council was superior, and the controversy became especially bitter in France. Charles VII. selected certain passages from the Conciliabule of Basle, and in 1438 issued a pragmatic sanction in which the superiority of the council over the pope was declared, and elections both to episcopal sees and in monasteries were to be held after the ancient law of France. Louis XI. suppressed this decree, but it was revived after his death until finally condemned by the Fifth Lateran Council, and changed by

the concordat made between Leo X. and Francis I. In this concordat many of the dispositions of the pragmatic were preserved; but the concordat differed from the pragmatic in this: that in place of the election of bishops and prelates in case of vacancy the king was given the right to present to the sovereign pontiff, within six months, a doctor or licentiate in theology who should be at least 27 years of age and otherwise competent. The pontiff would grant institution. The parliament, after a long contest, agreed to the execution of this concordat. Herein is seen the beginning of the system of government nomination of bishops, concerning which, in 1903–4, the Pope and the French government were at variance. In the 16th century the government long opposed the publication of the decrees of the Council of Trent, but finally, without mentioning the source, the chief decrees, word for word, were published in 1579 by royal order. In 1681 the Gallican clergy, at the instance of the government, met in extraordinary convention and adopted a declaration favoring the extension of the *Regalia* to all France. This was repudiated by Pope Innocent XI. The next year the Gallican clergy adopted four propositions in which they attacked the Holy See in administrating temporal matters, and declared that the judgment of the Pope on a matter of faith was not irreformable except when the consent of the Church had been added. The king ordered the observance of this declaration, but it was condemned by Alexander VIII. Later, King Louis XIV. wrote the Pope that he had ordered that the decree should not be observed. Nevertheless, the *Regalia* was observed up to 1789 throughout all France, and the government continued taking the revenues of all vacant bishoprics and appointing to benefices during the interregnum. In an edict of 1695 a code of ecclesiastical law as observed in France was enacted, and in it was the appeal "as from an abuse," that is, from the ecclesiastical to the civil authorities. The national convention in 1790 passed a civil constitution for the clergy by which dioceses and parishes were suppressed and the Church made subject to the state. In 1801 Napoleon, as first consul, and Pope Pius VII. made a concordat in which the Catholic Church was acknowledged as the state Church, and by which new limits were assigned to dioceses and parishes, and by which especially the right of nominating bishops was given to the ruler of France. To the nominees the Pope would grant institution. Various other regulations were made, and the French government took upon itself the support of the bishops and parish priests in place of restoring the immense church properties which had been confiscated. During the year 1904 a great agitation occurred for the suppression of this concordat because of controversies over some bishops held delinquent and suspended by the Pope. With the abrogation of the concordat the state will not longer support the clergy, nor can it nominate to bishoprics. During the 19th century the liturgical worship of the Church in France was made conformable to that of Rome, and other matters of discipline were brought under general canon law.

Undoubtedly canon law has exerted a wide and lasting influence on the nations of Europe and America. It made them Christian states and directly or indirectly modified their constitutions. State legislative assemblies based their proceedings on the methods of Church councils. The law of nations is simply the application to nations of the principles of Christian law taught to individuals. The ancient Romans as well as barbarous tribes considered all foreigners enemies; the Church taught the brotherhood of all men. The Pope, as the common father of all Christians, acted as arbitrator in the disputes between nations, and so noteworthy became the Roman Rota, to which the Pope referred international disputes, that at times much of its work was deciding important questions for rulers of nations. The system of Church administration served as a model for that of states, and the clergy, especially in the earlier and Middle Ages, being the educated class and following canon law, naturally introduced many of its rules into everyday life. The elevated condition of woman is due to the canon law prescriptions regarding marriage, which the Church enforced on all nations converted to Christianity. Questions relating to widows and orphans were within the jurisdiction of canon law and Church courts. The incorporation of Church bodies, from which other corporations took their origin, had its foundation in the law of Justinian and was imported into England with the civil and canon law. As in the Roman law, the charter of the sovereign is always expressed, or at least implied. From England the idea of corporation and corporation sole came into American law. The writ of habeas corpus had its origin in the Roman law "*interdictum de libero homine exhibendo.*" Inheritance by will and the rule for the descent of real property came from Roman law, while trial by jury, with challenges of the jurymen, was determined in the Roman Lex Servilia and Lex Cornelia. While in England "Christianity is part of the law of the land," in the United States this "is true only in a qualified sense" (33 Barber 548), and owing only to "the fact that it is a Christian country and that its constitution and laws are made by a Christian people" (23 Ohio St. 211). Nevertheless "the decision of ecclesiastical courts or officers having, by the rules or laws of the bodies to which they belong, jurisdiction of such questions, or the right to decide them, will be held conclusive in all courts of civil administration, and no question involved in such decisions will be revised or reviewed in the civil courts, except those pertaining to the jurisdiction of such courts or officers to determine such questions according to the laws or usage of the bodies which they represent." (Quoted with approval in 98 Penn. 213.) "Civil courts will not review the action of ecclesiastical tribunals except where rights of property are involved" (62 Iowa 567; 23 Ill. 456). Justice Strong, in 'Relations of Civil Law to Church Policy,' concludes: "I think it may be safely asserted, as a general proposition, that whenever questions of discipline, of faith, of church rule, of membership, or of office have been decided by the Church in its own modes of decision, civil law tribunals accept the decisions as final and apply them as made." See also LAW; CATHOLIC CHURCH, ROMAN.

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Canon of the Mass, that part of the mass following the sanctus. The rule of the Roman Catholic Church for celebrating the Eucharist is contained in this canon.

Canon of Scripture. See CANON; BIBLE.

Can'oness. At the close of the 8th century the title of canoness was given to a class of women who took the vows of chastity and obedience, but not that of poverty, and were not cloistered, though they had a common table and dormitory, and were bound to the recitation of the breviary, as were nuns. They derived their name from their being enrolled in the canon or official list of the church. Their occupations were chiefly education of girls, transcription and embellishment of church office-books, and embroidery of vestments. The advantages of such institutions as asylums in a rough age were soon visible, and they multiplied in consequence, but as in many houses the religious motive had little to do with entrance, a distinction was drawn ere long between canonesses regular and secular. The secular canonesses were for the most part members of princely or noble families, practised much state and luxury, and retained none of the rule save the common dormitory and the recitation of the Hours in choir. In Germany, several abbesses of canonesses were princesses of the empire, kept up feudal state, and furnished contingents to the imperial army from their vassals; and at the Reformation some chapters adopted the new opinions, and subsist to the present day as Protestant foundations, enjoying the revenues, and admitting to membership only ladies of noble birth or daughters of distinguished members of the military and civil services, whose sole obligation is celibacy during membership. The institute never spread beyond the limits of the empire, and the non-German houses were chiefly in Hainault, Flanders, and Lorraine.

Can'ongate, The, the principal street in the Old Town of Edinburgh. It is upward of one mile in length, rising gradually with a regular and steep incline from a small plain at the east end of the town, on which stands the palace of Holyrood, and terminating at the castle. The appearance of this street, the scene of many interesting historical incidents, is rendered remarkable by the loftiness and antique aspect of the houses with which it is lined, most of them ranging from five to seven stories in front, and often more behind. At different points it is known by other names, High Street, Lawnmarket, etc.

Canon'ical Books, the books of Scripture belonging to the canon. See CANON; BIBLE.

Canonical Hours, certain times of the day set apart by ecclesiastical law in the Roman Catholic Church to the offices of prayer and devotion, namely, matins with lauds, prime, tierce, sext, nones, even-song or vespers, and compline. The day was divided into seven parts and the observance of the canonical hours was as follows: prime, tierce, sext and nones at the first, third, sixth and ninth hours of the day, counting from six in the morning; vespers at the eleventh hour, compline at midnight and matins shortly after midnight. These times are no longer strictly adhered to. In England the canonical hours are from eight to twelve in the forenoon, before or after which the marriage service cannot be legally performed in any parish church.

Canonicals, the prescribed dress or vestments worn by the clergy of the Roman Catholic, Protestant Episcopal, and other churches when officiating at religious services. The wearing of vestments is of ancient origin. In all the pagan religions the priests wear symbolic garments, and in the Jewish system the priestly robes were very elaborate and significant. The modern Jewish system retains these ecclesiastical vestments and the ministers of many Protestant denominations wear such attire. See CHASUBLE; STOLE, etc.

Canon'icus, Indian chief: b. about 1565; d. 4 June 1647. When the Pilgrims landed, he and his nephew Miantonomo (q.v.) were associate sachems of the fierce Narragansetts, mustering some 3,000 warriors. In the winter of 1621–2 he sent to the little colony, with about 50 fighting men, a bundle of arrows bound with a snakeskin, either as a preliminary of war or a demand of gifts to avert it. They returned the skin stuffed with powder and ball, and the frightened savages did not dare keep it, but saw that it got back to the colony. A lasting treaty was negotiated, and it was partly owing to the influence of Canonicus that the tribe never made war against the English, even many years after his death, till "King Philip's War" of 1675. In 1636 the septuagenarian chief was succeeded as head sachem by Miantonomo, but still retained the prestige of age and experience. In that year Roger Williams and his company, who had first sought refuge from the Massachusetts authorities among the Pokanokets, thought it best to go farther, and applied to the Narragansetts. They were kindly received, and to them was granted the peninsula where Providence stands. According to Williams, Canonicus was always most friendly and helpful till his death. In 1637 the Pequots of Connecticut were attempting to form a general Indian league to exterminate the English settlements, and the Massachusetts government sent an embassy to prevent the Narragansetts from joining it. Canonicus received them with great Indian pomp in his wigwam of poles and mats, surrounded by his "mugwumps" and leading warriors, gave them a feast with boiled chestnuts and huckleberry Indian pudding for dessert; and probably more from kind regard for Williams than through the embassy's persuasions — kept the peace, and even furnished a couple of hundred warriors to help the English. These allies, however, played the usual ambiguous Indian part, ready to massacre the beaten side. In 1644 the Gorton (q.v.) party succeeded in persuading the chiefs that it was under the protection of irresistible powers in England; and on 9 April Canonicus, his son Mixan, and his nephew Pessacus, brother and successor of Miantonimo, signed two astonishing documents, of whose purport it is very unlikely that they had been correctly informed. One of them ceded the land and people of the Narragansetts to his Majesty of Great Britain, placing the Indians themselves under his protection, and appointing Gorton and three others their attorneys to carry the instrument to him. The other, addressed to the Massachusetts authorities, was

the refusal of their invitation to visit Boston. It also menaced the authorities on account of Miantonimo's death, and threatened to revenge it on Uncas. Finally, however, a truce was signed, and three years later Canonicus died.

Canoniza'tion, a ceremony in the Roman Catholic Church, by which deceased persons are declared saints. Alexander III., in 1170, pronounced it an exclusive privilege of the papal chair. This ceremony is one of great solemnity. The Pope institutes a formal investigation of the qualifications of the deceased person recommended for canonization, in which his manner of life and the genuineness of the miracles ascribed to him are strictly examined; and a promoter of the faith, commonly called the devil's advocate, is appointed to assail the candidate's memory. If the examination is satisfactory, the Pope pronounces the beatification of the candidate. (See BEATIFICATION.) In order to collect new proofs of his merits (for example, of miracles performed by his relics), the actual canonization generally takes place many years afterward; and then a day, usually the anniversary of the death of the new saint, is dedicated to his honor, his name is inserted in the canon, that is the list or register, of the Saints (thence canonization), churches and altars are consecrated to him, and his remains are preserved as holy relics.

Canons, Book of, a system of canons or rules prepared for the Church of Scotland by its bishops, in accordance with the direction of Charles I. It was published in 1636, having undergone revision at the hands of Archbishop Laud. In Scotland its promulgation was felt to be arbitrary, and the strongest objections were made against it.

Canons of the Church of England, the «constitutions and canons ecclesiastical» drawn up in convocation in 1604 by the synod in London. These canons, still in force as revised, number 141, and were designed to confirm the established system of the Church of England, particularly through the test oath, aimed at the Puritan party, in which the clergy were sworn to subscribe willingly to the supremacy of the sovereign, to the Articles, and to the Prayer-book.

Canon's Yeoman's Tale, The, one of Chaucer's 'Canterbury Tales.' The narrator, the ill-treated guard and servant of a worthless canon, describes the manner in which alchemists, such as his master, contrive to dupe their victims.

Cano'pic Vases, or **Cano'pi,** certain large-bellied vessels found in tombs in Egypt, containing the embalmed intestines of bodies that had been converted into mummies. Four of these were placed in a tomb, each appropriated to a particular deity, and surmounted by the effigy of the head of such deity, as of a man, an ape, a jackal, or a hawk. It is to those with the human head that the term canopi has been more particularly applied. They were frequently made of basalt, and decorated with figures in relievo or paintings; or of costly white alabaster, with spiral flutings; or they were formed from black burned clay. The name is derived from the town Canopus.

Canoppi, Antonio, än-tō'nē-ō kä-nō'pē, Italian scene-painter: b. 1773; d. St. Petersburg, 1832. He received his first education from his father, who was employed as civil engineer by the Duke of Modena, and after occupying himself for some time with fresco-painting, was subsequently employed as scene-painter in Venice and Mantua. Compelled to resort to flight at the time of the French invasion, he first betook himself to Vienna and afterward to Moscow, where he was engaged in the decoration of many palaces, which, however, were burnt in the great fire of 1812. From that time until his death he was engaged as scene-painter of the imperial theatre of St. Petersburg. His most admired efforts in that branch of art were his architectural scenes for Mozart's 'Magic Flute,' and for 'Semiramis.'

Cano'pus, or **Cano'bus,** a bright star of the first magnitude, belonging to the southern constellation Argo, and invisible in the north or middle parts of the United States, on account of its nearness to the South Pole.

Cano'pus. 1. In Egyptian mythology, a water-god, represented on vessels of a spherical shape. These vessels were used by the ancient Egyptians to keep the water of the Nile in good drinking condition. The worship of Canopus was superseded under the first Ptolemy by that of Serapis — a Greek inscription in honor of Serapis at Canopus having been discovered by Mr. Hamilton amid the ruins of Alexandria. 2. In ancient geography, one of the most remarkable towns of lower Egypt, near the most western mouth of the Nile. The name of the town is variously ascribed to the divinity of the same name and to Canopus, or Canobus, the helmsman of Menelaus, who died in Egypt of the bite of a serpent, after his return from Troy, and who was buried on the site of the town. It was the seat of a temple of Serapis, whose oracle was celebrated, especially among the sick seeking for restoration to health. 3. In astronomy, the name of the brightest star except Sirius. It is in the constellation Argo.

Can'opy, a net of very ancient use, as in Greece and Egypt, for protection against mosquitoes, gnats, etc.; hence any net or hanging placed over a bed for like purpose; also such a hanging or a projection over a bed, a door, a window, an altar, a pulpit, throne, niche, tomb, or other architectural structure. Canopies are also borne over the heads of kings or other personages and over sacred objects in ceremonial processions.

Canosa (kä-nōs'sä) **Di Puglia,** Italy, a city in the province of Bari, 14 miles to the southwest of Barletta on the Adriatic. It was the ancient Canusium, and various relics of Roman times, including an amphitheatre, have been found. Between Barletta and Canosa was the ancient Cannæ (q.v.), where in 216 B.C. Hannibal defeated the Romans. Tombs cut in rock on a hill have been found in the neighborhood, and in 1813 a beautiful burial-chamber was opened, which contained the corpse of a warrior in armor. A copper lamp and a number of beautiful vases were also found here. The paintings upon the vases were the most important part of this discovery. They refer to the Greek-Italian mysteries. Pop. about 25,000.

Canossa, a ruined mountain castle of northern Italy, 12 miles southwest of Reggio. In the 11th century it belonged to Countess Matilda of Tuscany, with whom Pope Gregory VII. resided in 1077, when he imposed a severe

penance upon the excommunicated Emperor Henry IV. (q.v.). The phrase "to go to Canossa" has come to be proverbial for some humiliating surrender, withdrawal, or the like.

Canot, kä-nō', **Theodore,** Italian adventurer and slave trader: b. Florence, 1807; d. 1850. His father was a captain and paymaster in the French army; his mother a native of Piedmont. He made his first voyage in 1819, in the American ship Galatea, of Boston, from Leghorn to Calcutta. He visited Boston, sailed to various parts of the world, was shipwrecked near Ostend, and again on the coast of Cuba, where he fell into the hands of a gang of pirates, one of whom claimed to be his uncle, befriended him for some time, and finally sent him to an Italian grocer at Regla, near Havana, who was secretly concerned in the African slave trade. Canot made his first voyage to Africa in 1826, landing at the slave factory of Bangalang, on the Rio Pongo, Senegambia. After quelling a mutiny on board and helping to stow away 108 slaves under 15 years of age, in a hole 22 inches high, the young adventurer entered the service of the owner of the factory. He soon became a favorite with the native chiefs, whose proposals of matrimonial alliance were exceedingly embarrassing. He visited various parts of the neighboring country, improving every opportunity to study the workings of the trade in which he had determined to engage, and collecting by the aid of the African princes a stock of slaves for his newly established depot at Kambia near Bangalang. In May 1828 his factory and goods were destroyed by fire. He afterward purchased a vessel at Sierra Leone, in which with a cargo of slaves wrested from a trader in the Rio Nunez, he sailed to Cuba. Three more expeditions soon followed; in the first he lost 300 slaves by smallpox; in the last he was taken by the French and condemned to 10 years' confinement in the prison of Brest, in France, but after a year's durance was pardoned by Louis Philippe. Resolved still to pursue his dangerous occupation, he returned to Africa, and was the pioneer of the slave traffic at New Sestros. After meeting with various adventures here in his expeditions among the surrounding tribes, we hear of him in 1839 on a pleasure trip to England. He returned to New Sestros and in 1840 shipped to Cuba 749 slaves. He now resolved to abandon his illicit course, and obtaining from an African chief a valuable grant of land at Cape Mount, established there in 1841 a trading and farming settlement under the name of New Florence. In March 1847 New Florence was destroyed by the British, who suspected it to be a slave station, and Canot subsequently removed to South America, where he engaged in legitimate commerce. He resided for some time in Baltimore, Md., and finally received from Napoleon III. an office in one of the French colonies in Oceanica. Consult Mayer, 'Captain Canot, or Twenty Years of an African Slaver' (1854).

Canova, Antonio, än-tō'nē-ō kä-nō'vä, Italian sculptor: b. Possagno, Venetia, 1 Nov. 1757; d. Venice, 13 Oct. 1822. Canova may be considered as the restorer of the graceful and lovely style, and the founder of a new school, as far as it respects softness and delicacy of execution, and excellent handling of the marble. He was sent as an apprentice to Bassano, where he acquired skill in the mechanical part of the art. His first work, executed in his 17th year, was an Eurydice in soft marble, of half the natural size. He was now sent to the Academy of Venice, where his proper study commenced. He gained several prizes, and excited expectations which he more than equalled in the sequel. The first work which he was commissioned to execute was the statue of the Marchese Poleni, of the natural size, for the city of Padua. In his 25th year he finished the group of Dædalus and Icarus, of the natural size, in Carrara marble, a remarkable juvenile work. The senate of Venice sent him, in 1779, to Rome, with a salary of 300 ducats. A group as large as life — 'Theseus Sitting upon the Slain Minotaur' — was the first large work by which Canova made himself known in Rome (1783). In 1783 he undertook the execution of the tomb of Pope Clement XIV., in the church Degli Apostoli. He retained the usual style of composition, and only improved on the depraved taste of the school of Bernini. He next executed the group of 'Cupid and Psyche,' where he first displayed his own peculiar style, of which loveliness is a striking characteristic. The figures are exceedingly delicate and graceful. He was employed on a second public monument, the tomb of Pope Clement XIII., in St. Peter's. It was finished in 1792, and is distinguished by its colossal size and simple style. Meanwhile the fame of the artist continually increased. He established in the palace of the Venetian ambassador a school for the benefit of young Venetians. His next works were a winged Cupid, standing; another group of 'Cupid and Psyche'; a group of 'Venus and Adonis' for the Marchese Verio, in Naples; the tomb of the Venetian Admiral Emo, for the Republic of Venice. This is a combination of bas-reliefs with figures in full relief. Canova also produced a very lovely 'Psyche,' standing, half-dressed, with a butterfly in her left hand, which she holds by the wings with her right, and contemplates, with a calm, smiling mien. A 'Repentant Magdalene,' of the natural size, belongs to the works in marble in which he has carried the expression of the melting and the soft to the highest degree. His 'Hebe' is a delightful figure. In an easy and animated attitude the smiling goddess of youth hovers upon a cloud, pouring nectar with her right hand into a bowl which she holds in her left. Both vessels, as well as the coronet of Hebe and the edges of her garment, are gilt. Canova is fond of a variety of material, and often endeavors to give to his statues the effect of pictures. He next displayed his talent for the tragical in the raging 'Hercules Hurling Lichas into the Sea.' The group is colossal, and Hercules somewhat larger than the Farnesian; but it makes a disagreeable impression, which proves that the genius of Canova was not adapted to such subjects. His representation of the two pugilists, 'Kreugas and Demoxenos,' is much more successful. A standing group of 'Cupid and Psyche' was the triumph of his art. Psyche here appears again holding the butterfly. In 1796 and 1797 Canova finished the model of the celebrated tomb of the Archduchess Christina of Austria, wife of Duke Albert of Saxe-Teschen, which in 1805 was placed in the church of the Augustines at Vienna. In 1797 he made the colossal model of a statue of the king of

Naples, one of his finest works. This statue, 15 palms high, was executed in marble in 1803. During the revolution of 1798 and 1799 Canova accompanied the senator prince, Rezzonico, on a journey through Germany. After his return he remained for some time in the Venetian territory, and painted for the church of his native village an altar-piece, in which are represented the dead Christ, the Maries, Nicodemus, and Joseph, and, on high, God the Father. He afterward executed in Rome his 'Perseus with the Head of Medusa,' which, when the Apollo of Belvidere was carried to France, occupied its place and pedestal. This statue increased the fame of Canova more than any of the preceding works. But Perseus is only an imitation of the Apollo. The separate parts are of exquisite beauty in form as well as in masterly, delicate finishing. In 1802 he was invited by Bonaparte to Paris to make the model of his colossal statue. In the beginning of 1803 the model of the emperor's bust, and afterward that of his statue, was to be seen in the workshop of the artist. There is not a more successful work of the kind than this bust: the figure of the statue is not so good. Among the later works of the artist are a Washington, of colossal size, in a sitting attitude; the tombs of the Cardinal of York and of Pius VII.; an imitation of the Medicean Venus; a 'Venus Rising from the Bath'; the colossal group of 'Theseus killing the Minotaur,' far surpassing his earlier works in the heroic style; the tomb of Alfieri, for the Countess of Stolberg, in Florence, and erected in that place (the 'Weeping Italia,' a colossal statue in marble, is particularly admired); the 'Graces Rising from the Bath'; the monument of the Marchioness of S. Croce; a 'Venus'; a 'Dancing Girl,' with almost transparent garments; a colossal 'Hector'; a 'Paris'; a 'Muse,' larger than the natural size; a model of a colossal 'Ajax'; and the model of a sitting statue, in rich robes, of the Archduchess Maria Louisa of Austria. After the second fall of Napoleon, in 1815, Canova was commissioned by the Pope to demand the restoration of the works of art carried from Rome; went from Paris to London, and returned to Rome in 1816, where Pius VII. inscribed his name in the golden book of the capitol, declared him "to have deserved well of the city of Rome," and made him Marquis of Ischia, with a pension of 3,000 scudi.

As a man Canova was active, open, mild, obliging, and kind toward everybody. His opinion of himself was very modest, notwithstanding his fame was spread through all Europe. He assisted promising young artists, and established prizes for the encouragement of the arts. When the Pope conferred upon him the title of Marquis of Ischia, with a pension, he dedicated the whole of the latter to the support and encouragement of poor and deserving artists. Canova was also an agreeable painter, but, strangely enough, more of a colorist than a correct designer. See lives of Canova by Ciognara (1823); Missirini, (1824); the biographies of Rosini (1825); D'Este (1864). Engraved representations of all his works have appeared in Italy and at Paris.

Canovaï, Stanislao, stän-īs-lä'ō kä-nō-vä'ē, Italian ecclesiastic and historian: b. Florence, 27 March 1740; d. there, 17 Nov. 1811. Having taken holy orders, he officiated afterward as professor of mathematics at Parma. In 1788, as a member of the academy of antiquities, he contended for the prize which was offered for an essay on Americus Vespucius. He opposed the common opinion that Columbus was the first discoverer of the new world, claiming that Vespucius one year before him had touched upon the northern part of the continent and had landed in Brazil. His paper gained the prize, but produced much discussion.

Canovas del Castillo, Antonio, än-tō'nē-ō kä'nō väs děl käs tēl'yō, Spanish statesman and man of letters: b. Malaga, 8 Feb. 1828; d. Santa Aquedo, 8 Aug. 1897. He was editor of the Conservative journal, 'Patria,' and in 1854 entered the public service as member of the Cortes; thereafter he held various posts in the government. At his death he had been for two years prime minister, and had held the same position three times previously. He is author of 'Literary Studies' (1868); 'History of the Austrian Dominion in Spain' (1869); 'Problems of the Time' (2 vols. 1884); 'Studies on the Reign of Philip IV.' (3 vols. 1888–90). He was editor-in-chief of a 'General History of Spain,' consisting of monographs by sundry writers (1890–7). He was assassinated at the baths of Santa Aqueda. See Pons y Humbert, 'Canovas del Castillo' (1901).

Canrobert, François Certain, fräṅ swä sĕr-tăṅ käṅ-rō-bār, marshal of France: b. St. Cere in Lot, 27 June 1809; d. Paris, 28 Jan. 1895. He was educated in the military academy of St. Cyr, and in 1828 entered the army. He had seen nearly 20 years' brilliant service in Algeria, and had actively supported the future emperor at the *coup d'état* of 1851, when he received the rank of a general of division in 1853. As such he commanded the first division of the French army under Marshal St. Arnaud, sent to the Crimea in 1854; and at the battle of the Alma was wounded in the breast and hand by the splinter of a shell. On St. Arnaud's death, nine days later, Canrobert assumed the chief command of the French army. According to the historian Kinglake, he deliberately retarded the progress of operations, let slip many opportunities, and hampered the English — his object being to forward Napoleon's design of coming out to head a final and victorious campaign. In the war in Italy against the Austrians (1859) Canrobert had the command of the third division of the French army, and at the battles of Magenta and Solferino his *corps d'armée* was engaged. In the Franco-German war of 1870 he was shut up in Metz with Bazaine, and became a prisoner in Germany. He was an ardent Imperialist till the death of the Prince Imperial (1879). In 1876 he became a member of the Senate. See Martin, 'Le Maréchal Canrobert.'

Can'so, Gut or **Strait of,** a narrow strait or channel, about 17 miles long and 2½ miles in width, separating Nova Scotia from Cape Breton island. It is navigable by the largest ships, and its scenery is very beautiful.

Canstadt, kän'stät, the name given, from Cannstatt or Canstadt, Germany, to the dolichocephalic or long-headed man of the Quaternary age, whose existence was inferred from a piece of skull found near there in 1700.

Canstein, Karl Hildebrand von, kärl hĭl'dē-brănt fŏn kän'stīn, German founder of a famous establishment for printing Bibles: b. Lindenberg, 1667; d. 1719. He studied at Frankfort-on-the-Oder, traveled much in Europe, went in 1688 to Berlin, where he was appointed page of the Elector of Brandenburg, and served as a volunteer in the Netherlands. A dangerous sickness obliged him to leave the military service. He went to Halle, where he became familiarly acquainted with Spener and Francke, and became eager to spread a knowledge of religion among the common people. He was especially anxious that the poor should have Bibles at as low rate as possible, and thus originated the famous institution, called the Canstein Bible Institution, which after the death of Canstein in 1719 became associated with the institutions founded by Francke, and still continues its benevolent operations.

Cant-timbers, in ship-building, those timbers which are situated at the ends of a ship. They derive their name from being *canted,* or raised obliquely from the keel, in contradistinction from those the planes of which are perpendicular to it.

Cantabile, kän-tä'bĭ-lā, in music, a term applied to movements intended to be performed in a graceful, elegant, and melodious style.

Cantabri, kän-tā'brē, the rudest and most valiant of all the Iberian tribes, who dwelt in the ancient Hispania Tarraconensis, and inhabited the greater part of what is now La Montana and the northwest part of the present province Burgos. In ancient history Cantabri is generally used to denote all the inhabitants of the northern mountains of Spain. Cantabria is the name which was given to the country they inhabited. Oceanus Cantabricus is the ancient name of the Bay of Biscay. Cantabrian Mountains is the general name of the various mountain ranges extending from the western Pyrenees along the north coast of Spain to Cape Finisterre. The highest of the ranges, the Sierra d'Aralar, attains an altitude of 7,032 feet. These mountains are imperfectly known, but in parts they are covered with magnificent forests, and from those of Santander the snow never entirely disappears.

Canta'bria. See CANTABRI.

Canta'brian Mountains, the general name of the various mountain ranges extending from the western Pyrenees along the north coast of Spain to Cape Finisterre. They attain in some parts a height of about 9,000 feet, and are rich in minerals, especially copper, lead, iron, and gold. Large forests of oak, chestnuts, and other trees are also found on their slopes.

Cantacuzenus, kän-tā-koo-zā'noos, **John,** Byzantine emperor and historian: b. about 1300; d. about 1383. While minister of Andronicus III. he negotiated a favorable peace with the Genoese in 1336, and repelled the encroachments of the Turks in 1337. On the death of Andronicus in 1341 Cantacuzenus became regent during the minority of the young emperor, John Palæologus. He defeated the Bulgarians and Turks, assumed the diadem, and entered Constantinople, victorious over his rivals, in 1346. He used his power with moderation, and endeavored to heal the wounds which five years of civil war had inflicted on the state; but religious disputes, civil dissensions, and foreign enemies soon disturbed his government; and the jealousy of Palæologus, the rebellion of his own son, war, plague, the frightful disorders which prevailed in the empire, and his own loss of popular favor, induced him to renounce the crown. He retired to a monastery (1355), where he employed himself in literary labors. He is considered one of the greatest among the successors of Constantine. His 'Four Books of Byzantine History' were printed in 1645, and belong to the collection of the Byzantine historians. His other works, principally theological, are partly printed and partly in manuscript.

Cantal, käñ tăl, France, a central department, area, 2,217 square miles; capital, Aurillac. It is named from its highest mountain, the Plomb du Cantal, Mons Celtorum of the ancients, which rises to the height of 6,094 feet. The department is one of the poorest and least productive districts of France. The climate is rather severe near the mountains. Agriculture is in a backward state. The principal crops are rye, buckwheat, potatoes, and chestnuts, and some hemp and flax. Of wheat and oats the product is insufficient for the consumption. Cattle, sheep, horses, and mules are raised in large numbers; and on the refuse of the dairies numerous pigs are fed. The fat cattle from this department are much esteemed, and are sent to all parts of the country. Large quantities of cheese are made, and sold principally in the south of France under the name of Auvergne cheeses. The minerals, as a whole, are unimportant. Hot mineral springs are abundant, those of Chaudes-Aigues being the most frequented. The manufactures are of trifling importance. Cantal is divided into four arrondissements, containing 23 cantons and 267 communes. Pop. (1901) 218,941.

Can'taloupe, a small round variety of musk-melon, globular, ribbed, of pale-green or yellow color and of delicate flavor; first grown in Europe at Cantalupo, in Italy. See MUSK-MELON.

Cantalupo, kän-tä-loo'pō, Italy, a town of Naples, province of Sannio or Molise, memorable for a French victory over the Neapolitans in 1798, and for a destructive earthquake, in which many lives were lost, in 1805.

Cantani, Arnoldo, Italian physician: b. Hainsbach, Bohemia, 15 Feb. 1837; d. Naples, 7 May 1893. He was educated at Prague, and was physician in the general hospital there. In 1864 he became professor of pharmacology and toxicology at Pavia; in 1867 he was director of the clinical institute at Milan, and in 1868 of that at Naples. In 1889 he became a senator of Italy. He investigated chiefly malaria, typhus, and tuberculosis; and was influential in introducing the methods of German medicine into Italy. He wrote 'Manuale di Materia Medica e Terapeutica' (1865); 'Manuale di Farmacologia Clinica' (1885–90).

Cantarini, Simone, sē mō nā kän-tä-rē'nē, also known as IL PESARESE, Italian painter: b. Pesaro, 1612; d. Verona, 1648. He studied under Guido Reni at Bologna, where he afterward painted a large number of pictures, all much in the style, but without the grace and delicacy, of his master's work. His 37 etchings

more closely resemble those of Guido. Throughout his life Cantarini's intolerable arrogance made him numerous enemies; and after a quarrel with his chief patron, the Duke of Mantua, he died in Verona. Among his best-known paintings are an 'Assumption'; 'A Holy Family'; and 'Joseph and Potiphar's Wife.'

Canta'ro, kăn-tä'rō, a measure of weight and capacity. As a measure of weight it equals in Turkey 124.7 pounds, in Egypt 98 pounds, in Malta 175 pounds, etc. The Turkish cantar as a measure of capacity equals about 31.5 gallons. The Spanish wine-measure cantaro is about three and a half gallons.

Cantata, kăn-tä'ta, in music, a species of vocal composition, consisting of an intermixture of air, recitative, duet, trio, quartette, and chorus. According to some, it was invented by Carissimi about the middle of the 17th century. By others its invention has been ascribed to Barbara Strozzi, a Venetian lady, in the 18th century. The subject may be sacred, pastoral, or amatory, and in the hands of some composers it takes the dimensions of a short oratorio or opera, but without acting. Mozart, Beethoven, Mendelssohn, and other great musicians have composed cantatas, and among English composers we may mention Purcell, Sterndale Bennett, Macfarren, and Henry Smart.

Canteen, in the United States army, (1) a soldier's tin flask, containing two to three pints, and covered with a woven fabric; (2) a co-operative store, at a camp or garrison, where spirituous liquors are on sale under certain regulations. In British use thē canteen is not a refreshment-bottle, but a sort of combination pan, dish, and plate, for use at mess. The departments of the British garrison store are usually divided into a dry canteen and wet canteen, the former being for general groceries and provisions, and the latter for liquid refreshment, excluding spirituous liquors.

Previous to 1901, beer and wine were allowed to be sold at the canteens in the United States army, though spirits were prohibited. In that year an anti-canteen law went into effect, as the result of temperance agitation. There has been wide discussion as to the merits and demerits of this law. The National Anti-Saloon League, at its annual session in Washington, in December 1902, adopted an address containing an argument favoring the law, as follows:

"The official reports of courts-martial show that the trials per 1,000 men more than doubled during the last three years of the canteen liquor-selling law, increasing from 52 per 1,000 men in 1898 to 100 in 1900, and that since the year 1900 (in which is included six months of the canteen liquor-selling and eighteen months of non-selling), the courts-martial have decreased to 61—that is, have decreased 39 per 1,000 men. The reports of the surgeon-general of the army show a marked decrease of disease . . . about 25 per cent. The same reports show a startling decrease in insanity of about 33 per cent."

During the time of the League's agitation the 'Army and Navy Journal' gave editorial utterance to the following, voicing another view of the situation:

"The adjutant-general of the army, in his annual report, states that since the canteen was abolished intoxication and offenses due to intoxication have greatly increased, and he declares it as his serious opinion that the increase of desertions and of trials for infractions of discipline is due in large degree 'to the abolition of the former privileges of the exchange.' The belief, which appears to be seriously entertained in some quarters, that the closing of the canteens has lead to a decreased consumption of liquor by the soldiers is ludicrous to the last degree. It is flatly refuted by a few simple facts. Immediately adjacent to the various posts of the army there are nearly 1,500 saloons, most of them dens of vice, where the liquor dispensed is of the vilest quality. The number of these places was increased by nearly 300 during the last fiscal year. . . . The nearly universal opinion appears to be that the abolition of the canteen was a mistake, and that its restoration would be a step in the direction of temperance and good order."

The United States Congress in 1902 appropriated $500,000 to build and maintain suitable buildings at army posts, for the recreation and sociability of the men, and also increased the rations five cents per day, to enable them to procure more delicacies without depending upon the profits of a liquor-selling canteen. When these buildings come into general use, and statistics can be had for a longer period, it will be possible to form a more accurate opinion as to the wisdom of abolishing the canteen.

Canterbury, England, cathedral city, and parliamentary, municipal, and county borough in Kent, 55 miles southeast of London, on the river Stour. It is supposed to have been a place of importance before the Roman invasion, the Roman name *Durovernum* showing apparently the British prefix *Dwr,* water, although antiquaries differ as to the remainder of the compound. Druidical remains have been found here, together with the British weapons termed celts. Its importance under the Roman dominion is proved by many circumstances; and especially by the discovery of a great variety of remains of that people; added to which, Roman bricks have been found in certain portions of the remaining walls. It derives its present name from the Saxon *Cant-wara-byrig,* the Kentishmen's city. During the residence of Ethelbert, king of Kent, the memorable arrival of St. Augustin took place in 596; an event rapidly followed by the conversion of this king and his people to Christianity; and the foundation of the archiepiscopal see of Canterbury. In the 8th and the three following centuries, the city was dreadfully ravaged by the Danes, and on one occasion, in 1011, nearly the whole of the inhabitants, including women, children, and the archbishop himself, were barbarously massacred, and the cathedral burned to its bared walls. It gradually, however, recovered, and at the Conquest its buildings exceeded in extent those of London. The ecclesiastical importance of the place, in particular, advanced with great rapidity, which was consummated by the murder of Thomas à Becket, whose canonization by the Pope rendered Canterbury the resort of pilgrims from every part of Europe. Not only were the priory and see benefited by the offerings of the rich devotees, but the prosperity of the town itself was greatly advanced by the money spent in it by so many wealthy strangers. Erasmus describes the church, and especially the chapel in which he was interred, as glittering with the gold and jewels offered up by the princes, nobles, and wealthy visitors of his shrine; all of which Henry VIII. appropriated to himself on the dissolution of the priory in 1539, when he ordered the bones of Becket to be burned to ashes. Several of the English monarchs have made a temporary residence at Canterbury, which was also occupied by Oliver Cromwell in the civil wars, whose troopers made a stable of the cathedral.

Canterbury is beautifully situated in a fertile vale, surrounded by gentle eminences, which supply numerous streams of excellent water. The principal thoroughfare is wide, the houses well built, and the streets in general well paved and lighted. It extends about half a mile east to west, and rather more north to south, with four suburbs at the four cardinal points. From all points Canterbury presents a picturesque appearance, its antique features contrasting finely with the sylvan scenery around. The most remarkable object in the city is the cathedral, one of the finest ecclesiastical structures in England. The original building, of which no part now remains, was of great antiquity, the distinction having been claimed for it of being the first Christian church in the kingdom. The present edifice, 530 feet in length, east to west, and 154 in breadth, has been built in different ages (the oldest part dating from the 11th century), and presents in consequence various styles of architecture (including the Norman and Early English), but retains altogether an imposing appearance. The great tower, 235 feet in height, is one of the most beautiful specimens of the Perpendicular style of Gothic; and the choir is also very fine. St. Augustine's monastery, restored and enlarged, is now a church missionary college. St. Margaret's Church has been restored in excellent taste; and the church dedicated to St. Martin, on a hill in the eastern quarter of the city, is believed to be one of the oldest existing Christian churches, and has also been restored. Other public buildings are the guild-hall, the corn-exchange, and a theatre. In addition to the royal grammar-school, founded by Henry VIII., there are numerous other schools, a mechanics' institution, museum and free library, an hospital, dispensary, and numerous other charitable institutions. In 1882 Sidney Cooper, R.A., presented an art gallery to the city. Canterbury was formerly noted for its silk manufactures, afterward supplanted by a superior kind of damask linen, which in turn has become extinct. There are several extensive breweries and malting establishments in the town, and leather, bricks, lime, ropes, etc., are manufactured. The principal articles of trade are corn and hops, in the cultivation of the last of which a number of the laboring class are employed. There are extensive barracks for cavalry and infantry. Canterbury sent two members to the House of Commons from Edward I.'s reign till 1885, when it lost one.

The Archbishop of Canterbury is primate and metropolitan of all England, and first peer in the realm after the royal family. He places the crown on the sovereign's head at the coronation, and wherever the court may be the king and queen are deemed his parishioners. The four prelates of London, Winchester, Lincoln, and Rochester, are respectively his provincial dean, sub-dean, chancellor, and chaplain. His province comprehends the sees of 24 suffragan bishops, and he has the nomination of the several officers belonging to the ecclesiastical courts over which he presides, and the privilege of conferring degrees in the faculties of law and divinity; formerly (till 1858) also of medicine. Pop. (1901) 24,868. See Willis, 'Architectural History of Canterbury Cathedral' (1845–69); 'Historical Memorials of Canterbury Cathedral' (1855); Gleeson White (1896); Evans and Goldney, 'Canterbury' (1899).

Can'terbury, New Zealand, a provincial district occupying the centre of South Island; capital, Christchurch. The famous Canterbury Plain, of 2,500,000 acres, slopes gradually down over a descent of 40 miles toward the sea. A rich loamy tract, admirably adapted for agriculture and cattle grazing, extends along the east coast, while the interior is a true pastoral country, well watered by numerous streams, and covered with a perpetual herbage of various grasses. A vast coal-field seems to underlie the whole country, and coal is worked in the districts of Timaru and Malvern. Good fire-clays, quartz, sand for glassmaking, marble, limestone, etc., are also found. The productions include wool, grain, frozen meat, skins and hides, butter, cheese, and some silk. The colony of Canterbury was established in the year 1850 mainly by members of the Church of England. Area, 14,040 square miles. Pop. (1901) 143,040.

Canterbury-bell, a name given to species of *Campanula* (q.v.), especially *C. medium* and *C. trachelium.*

Canterbury Tales. See CHAUCER.

Cantharel'lus. See FUNGI, EDIBLE.

Cantha'rides, kăn-thă'rĭ-dēs, blister-beetles (q.v.) when prepared for medical use. Our native American blister-beetles (especially *Epicauta villata* and *cinerea*) are not inferior to the Spanish-fly in vesicant qualities. By a strange misconception the presence of the brilliant green particles of the wing-cases in the powdered imported insect has been associated with their activity, and any sample of powdered cantharides or of prepared emplastrum where these brilliant particles are wanting would be condemned by many physicians. The recent introduction of the Chinese beetle (*Mylabris cickorii*) has done much to remove this misconception, for it has been shown that the *Mylabris* is much stronger than *Lytta vesicatoria,* yielding, according to analysis, fully double the quantity of cantharidin. Our native blister-beetles, when powdered, nearly resemble the *Mylabris* in color. (Saunders, 'Notes on Cantharides,' 'Canadian Entomologist,' Vol. VIII., December 1876.)

Cantha'ridin ($C_{10}H_{12}O_4$), the vesicating principle of cantharides. The methods of obtaining it consist in treating the powdered insects with a solvent, such as alcohol, ether, or chloroform, the last being preferable. The solution is evaporated, and the residue is purified from a green oil which adheres to it obstinately, by digesting with bisulphide of carbon or by redissolving in alcohol. Purification is further effected by animal charcoal, and the cantharidin is crystallized from hot alcohol or chloroform. It forms white crystalline scales, which fuse when heated and sublime, evolving an extremely irritating vapor. It is insoluble in water, but when mixed with the oils from the insect it is soluble. Chloroform is its best solvent, but it is taken up more or less freely by alcohol, ether, mineral acids and alkalies, and a variety of organic fluids. From most of these it is reprecipitated unchanged by diluting with water, or by neutralizing with the necessary reagent.

Can'thoplasty (Gr. *kanthos,* "the angle of the eye," and *plastikos,* "formative"), the formation by plastic operation of the angle of the

CANTERBURY CATHEDRAL.

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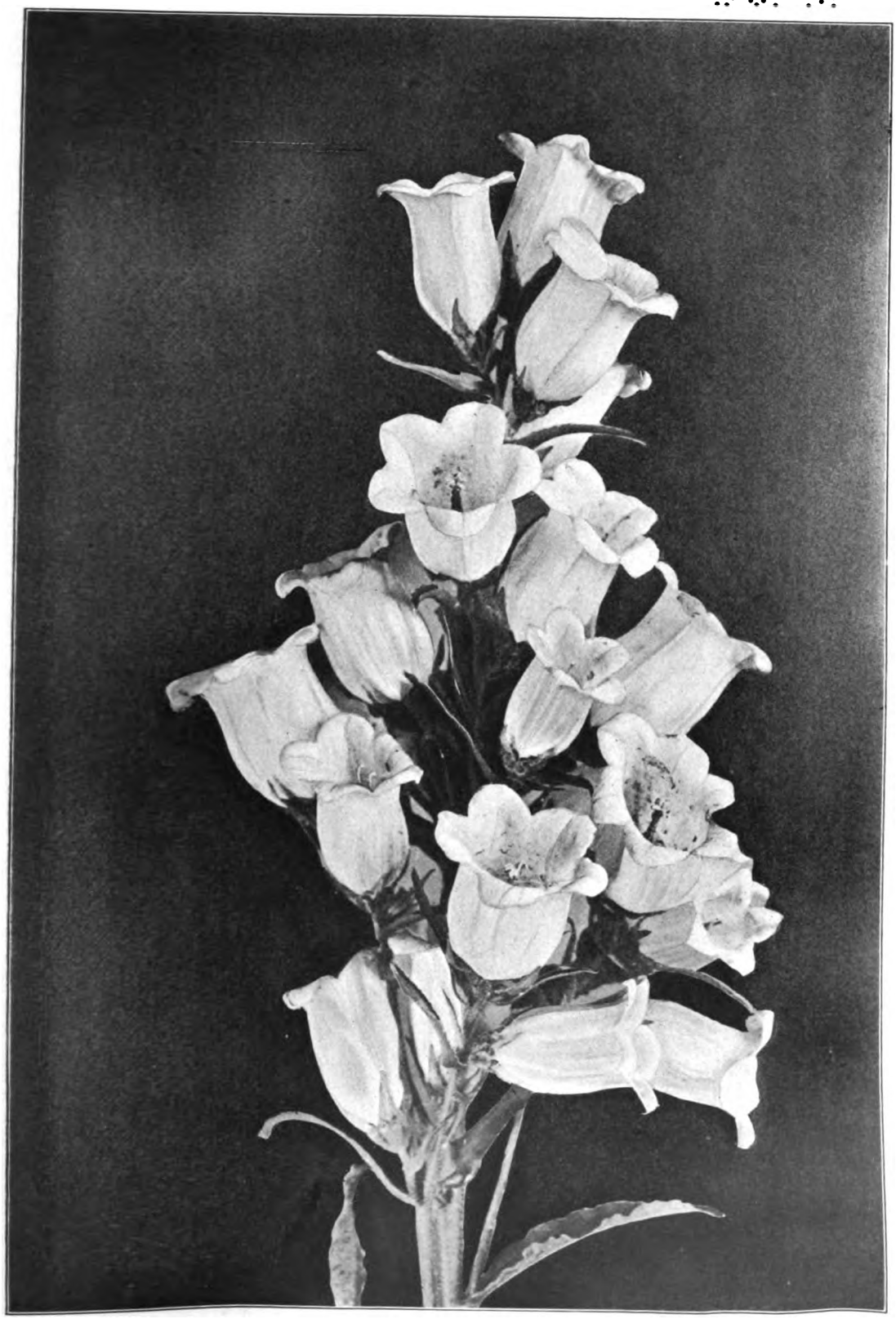


Photograph by J. Horace McFarland Co.

CANTERBURY BELLS (CAMPANULA)

Μαθ

eye, an operation proposed by Ammon when the eyelids are not sufficiently cleft, or when the eyelids produce tension on the eyeball, as in inflammatory processes.

Can'ticles, or **Song of Songs** (*Shirhashirim* in Hebrew, the *Canticum Canticorum* of the Vulgate), the fourth book of the Hagiographa, and the first of the so-called Megilloth, has its name of Song of Songs, from the superior beauty of its language and poetry. In a number of dialogues and soliloquies, written in most harmonious verses, it gives a glowing description of the tender, chaste, and faithful love, as well as of the beauty of two lovers betrothed, or bride and bridegroom; of rural scenes among the mountains of Lebanon and Hermon, among the hills and vineyards of Engedi, and in the environs of Jerusalem and Thirza; and of love itself, sweeter than wine, more fragrant than ointments, which cannot be bought, nor quenched by waters, nor drowned by floods. It is ascribed to Solomon, whose palaces, gardens, chariots, horses, guards, and wives are mentioned, enhancing by the contrast, the charms of calm rural life, full of song, innocence, and love. In regard to its form, its plot, and the order of its parts, as well as to its subject, it has been variously classified by ancient and modern writers; by Origen, in the preface to his comments, as an epithalamium in the form of a drama, which is also the opinion of Lowth and Michaelis; by Bossuet as a regular pastoral drama of seven acts, giving the scenes of seven days, of which the last is the Sabbath; by others as a collection of songs or idyls. Dr. Adam Clarke regards it as a poem *sui generis*, composed for the entertainment of marriage guests. Its canonicity has also been a matter of controversy; it seems to have been in question with the Jews at the time of the Mishna. Theodore of Mopsuestiæ, the friend of St. Chrysostom, attacked it most vehemently with arguments derived from the erotic character of the book, and was severely condemned for his attacks. Origen, who is said to have written 10 books of comments on the Canticles, containing no less than 20,000 verses, and his admirer Jerome, are among its most prominent defenders, supported by the circumstance that the book is contained in all the Hebrew copies of the Scriptures, in the translations of the Septuagint, of Symmachus the Jew, and of Aquila, and is mentioned in the most ancient catalogues of the Church, commencing with that of Melito, bishop of Sardis, who lived in the 2d century, though not expressly by Josephus. Modern criticism has also questioned the authorship of King Solomon, and several Aramaic words, the *yod* in the word David, and the abbreviation of the relative *asher*, etc., have been quoted as evidences against the generally accepted antiquity of the book, though none of these is conclusive. But no subject has excited more and livelier controversies, or has been a source of more learned and contradictory disquisition and scrutiny, than the question of the literal or allegoric and mystic sense of the book. Many modern critics both among Jews and Christians, not unsupported by the opinions of ancient and grave authorities, contend for the literal sense. They also widely differ in the interpretation of the meaning and object of the book. These writers account for its reception into the canon on the ground of its praise of faithful love, of conjugal affection, and the chastity of monogamy, or of a misunderstanding of the collectors. The more ancient opinion, on the other hand, which is alone regarded as orthodox in both Church and synagogue, defends the allegorical, religious, and sacred character of the songs. Thus, on the one side the subject is the love of a shepherd, of a youthful king, etc., and the beloved is a shepherdess, an Ethiopian princess, or, according to Grotius and others, the daughter of Pharaoh, wife of Solomon; while, on the other side, love appears as a spiritual affection, as the love of the God of Israel for his chosen but abandoned people, according to the Chaldee paraphrast, the rabbis, and even Luther; of Christ for the Church, between the soul of the believer and Christ, or as the connection between the divine and human nature, according to views current in the Church. Aben Ezra, a Jewish philosopher of the 12th century, finds in the book the hopes of redemption for oppressed Israel; Keiser, the restoration of the Mosaic law by Zerubbabel and Ezra; Hug, an attempt made in the time of Hezekiah to reunite the remnant of the 10 tribes to Judah; others, the love of wisdom; the alchemists, even the search for the philosopher's stone. Dr. Kirschbaum, of Cracow, brings the book down to the time of Hadrian, finds in it the last outbreak of Jewish patriotism and love of liberty, and in the *harai bather* the mountains of Bethar, so heroically defended by Bar-Cokeba. Besides the authors above mentioned who have written upon the Canticles, the names of Erasmus, Le Clerc, Rosenmüller, Eichhorn, Jahn, De Wette, Ewald, Robinson, Stuart, Delitzsch, Renan, Siegfried, Cheyne, and Black, must be mentioned. Mendelssohn and Dr. J. Mason Good have published admirable translations. Of those of Jerome only one is extant.

The name of canticles is also given to certain detached psalms and hymns used in the service of the Anglican Church, such as the Venite exultemus, Te Deum laudamus, Benedicite omnia opera, Benedictus, Jubilate Deo, Magnificat, Cantate Domino, Nunc dimittis, Deus misereatur, and the verses used instead of the Venite on Easter Day.

Can'tilever, a wooden or iron block framed into the wall of a house, and projecting from it to carry moldings, eaves, balconies, etc. The name is given also to a large projecting framework forming part of an iron bridge. See BRIDGE; BRIDGE CONSTRUCTION.

Cantium, căn'tĭ-ŭm, England, an ancient territory in South Britain, whence the English word Kent is derived, supposed to have been the first district which received a colony from the Continent. The situation of Cantium occasioned its being much frequented by the Romans, who generally took their way through it in their marches to and from the Continent. Few places in Britain are more frequently mentioned by the Roman writers than Rutupiæ (now Richborough). Portus Dubris (now Dover), Durobrivæ, and Durovernum (now Rochester and Canterbury) were also Roman towns and stations. Cantium made a part of the province called Flavia Cæsariensis. See KENT.

Canto Figurato, fē-gū-rā'tō, a term applied by the old Christian ecclesiastics to the chant in its more florid forms, or in which more than one note was sung to a syllable.

Canton, John, English electrician: b. Stroud, 31 July 1718; d. 22 March 1772. He settled as a schoolmaster in London, and was elected a Fellow of the Royal Society in 1749. He invented an electroscope and an electrometer; originated experiments in induction; was the first to make powerful artificial magnets; and in 1762 demonstrated the compressibility of water.

Can'ton, William, English writer: b. Isle of Chusan, China, 27 Oct. 1845. He was educated in France for the Roman Catholic priesthood, but decided upon a secular career and was for many years on the staff of the Glasgow *Herald*. Since 1890 he has been sub-editor of the 'Contemporary Review' and manager of the London publishing house of Isbister & Company. He is author of 'A Lost Epic and Other Poems' (1887); 'The Invisible Playmate,' a strikingly original piece of work (1894); 'W. V., Her Book, and Various Verses' (1896); 'The Invisible Playmate, and W. V., Her Book' (with final chapter) (1897); 'A Child's Book of Saints,' republished in the United States as 'W. V.'s Golden Legend' (1898); 'Children's Sayings' (1900).

Canton', China (more correctly *Quang-chow-foo*), a large and important city, situated on the Pearl River, at a distance of 80 miles from the sea. It is situated in the province of Quang-tung (of which name Canton is a corruption), and consists of the city proper and of many suburbs, and its total population is estimated at from 500,000 to 2,500,000. The city proper is enclosed by walls, forming a circuit of six miles, and is divided into two parts by a partition wall running east and west; the portion north of this wall, which is much the larger, being called the old, that on the south of it the new city. The walls, mainly of brick, rise to the height of 25 feet, with a thickness of about 20. There are 12 gates, all of which are shut at night. The streets are long and straight and in general paved with flat stones, but they are very narrow, the average breadth not exceeding eight feet. The houses of the poorer classes are mere mud hovels; those of the shop-keeping class are commonly of two stories, the lower of which serves as the shop. The streets are to a great extent lined with these shops, in which are to be found the productions of all parts of the globe. Neat and gaudily painted signs and names give a gay appearance to the narrow streets; in most cases there are no windows in front, but the whole is thrown open by day and closed at night. Temples and other religious edifices are very numerous, but few of them are in any way remarkable. There are two lofty pagodas, forming a notable feature in any general view of the city. One of these, 170 feet high, is about 1,300 years old, the other, 160 feet high, about 1,000. Among the chief temples, which are far from attractive buildings, may be mentioned those of the Ocean Banner, of the Five Hundred Gods, of Longevity, of the Five Genii. Among other buildings may be mentioned the residences of the governor-general, the commander-in-chief, the treasurer, the prefect, etc. There are four large prisons, one of them capable of holding 1,000 prisoners. In the European quarter are churches, schools, and other buildings in the European style. Wheeled carriages are not in use in Canton; goods are transported on bamboo poles laid across the shoulders of men, while people who can afford it have themselves carried about in sedan-chairs. The river opposite the city for the space of four or five miles presents a most interesting scene. The prodigious number of boats with which it is crowded is the first thing that strikes the eye. A large number of these — as many, it is said, as 40,000, containing a population of 200,000 — are fixed residences, and most of them moored stem and stern in rows. The inhabitants are called tankia or boat-people, and form a class with many customs peculiar to themselves. Millions are born and live and die in these floating dwellings without ever having put foot on dry land; while their ancestors for generations were all amphibious like themselves. The family boats are of various sizes, the better sort being from 60 to 80 feet long, and about 15 feet wide. A superstructure of considerable height, and covered with an arched roof, occupies nearly the whole of the interior of the boat. This structure is divided within into several apartments, devoted to different domestic purposes, all of them being kept very clean. The smaller boats of this description are not above 25 feet long, and contain only one room. By far the handsomest boats are the hwa-ting or flower-boats, which are graceful in form and have their raised cabins and awnings fancifully carved and painted. These are let to pleasure-parties for excursions on the river. The foreign mercantile houses, and the American, British, and French consulates have as their special quarter an area in the suburbs in the southwest of the city, with water on two sides of it. The river banks are faced with a granite wall; handsome hongs or factories have been built, and much money has been spent on improvements. The manufactures and other industries of Canton are varied and important, embracing silk, cotton, porcelain, glass, paper, sugar, lacquered ware, ivory carving, metal goods, etc. The direct trade between the United States and Canton is constantly growing, the exports and imports for 1902 being upward of $15,000,000 and $10,000,000 respectively. Its foreign trade has been known for three centuries throughout the world, and it was the chief foreign emporium in China until 1850, when Shanghai began to surpass it. Since then the opening of other ports and different causes have interfered with its prosperity, but it still carries on a large traffic, its exports and imports together often amounting to about $40,000,000. Business transactions between natives and foreigners are transacted in a jargon known as "pidgin-English." Since the establishment of the colony of Hong Kong there has sprung up quite a flotilla of river steamers, which ply daily between Canton, Hong Kong, and Macao, and convey the greater part of the produce and merchandise for native and foreign consumption. These steamers equal the best river boats of Europe, and carry large numbers of passengers. The climate of Canton is healthy; in July and August the thermometer may rise to 100° F. in the shade, and during winter it is at times below the freezing-point. Canton was first visited by English vessels in 1634. From 1689 to 1834 the East India Company had a monopoly of the English trade. In 1839 war was declared by Great Britain against China, and Canton would have been occupied but for being ransomed by the Chinese. In the war of 1856 the foreign factories were pillaged

and destroyed, and about a year after this Canton was taken by an English force. From this time to 1861 it was occupied by an English and French garrison. Since then it has been open to foreign trade.

Can'ton, Ill., city of Fulton County, situated on the Chicago, B. & Q. and the Toledo, P. & W. R.R.'s. It is the centre of trade of a fertile agricultural region; and has numerous industrial interests, including a large manufactory of agricultural implements, cigar factories, etc.; a public library and a high school. There are coal mines within the city limits. Pop. (1900) 6,564.

Canton, N. Y., a village and county-seat of Saint Lawrence County, on Grass River, and the Rome, W. & O. R.R., 59 miles northeast of Watertown. It is the seat of St. Lawrence University, and has large flour and lumber interests, a national bank, weekly newspapers, several churches, and an assessed property valuation of over $3,000,000. Pop. (1900) 2,757.

Canton, Ohio, city and county-seat of Stark County, on Nimisilla Creek and the Pennsylvania, the Baltimore & O., and the Cleveland, C. & S. R.R.'s; 60 miles south of Cleveland. It is in a fine fruit and wheat-growing district, with coal, limestone, and pottery clay in the vicinity, and was for many years the residence of President McKinley whose tomb is here. It is a manufacturing city of considerable importance. The principal industries are the manufacture of agricultural implements, brick and tile, foundry and machine-ship products, iron bridges, steel goods, and stoves. There are three national banks, besides several State and savings banks. The city has an electric light and street railway system, and well-paved streets. Among the notable buildings are the post-office, high school, public library, the United States signal service station, and several churches. Pop. (1900) 30,667.

Canton, S. D., the capital of Lincoln County, on the Sioux River, 20 miles from Sioux Falls. It is on the Chicago, M. & St. P. R.R., and is the seat of Augustana College. The town contains eight churches, public schools, and important manufactories, and is lighted by electric light. Pop. (1900) 1,943.

Canton, a small division of territory, constituting a distinct state or government, as in Switzerland, where each of the 22 states is so designated. In France judicial districts are called cantons.

Canton River. See CHUKIANG.

Cantoni, kän tō'nē, **Carlo,** Italian philosopher: b. Gropello, 1840. He studied law and philosophy at Turin, and philosophy at Berlin and Göttingen (under Lotze). He was professor at the lyceum at Turin, and in Milan; since 1878 he has been professor of philosophy at the University of Pavia. In his philosophical theory he agrees in general with Kant. He wrote: 'G. Battista Vico, studii Virtu e Comparazione' (1867); 'Corso Elementare di Philosofia' (1870); 'Guiseppe Ferrari' (1878); 'Emanuele Kant' (1879-84).

Canton'ment, the district in which troops are quartered when they are not collected into a camp, but detached and distributed over the neighboring towns and villages. The object of sending troops into cantonments is to be able to concentrate them as quickly as possible on one spot, when circumstances do not admit of a camp being formed, or do not render it advisable to form one. In India the permanent military stations erected in the neighborhood of the principal cities are so called.

Cantu, Cesare, chā-zā-rē kän'too, Italian historian, poet, and philosopher: b. Brisio, 5 Sept. 1805; d. 11 March 1895. He was educated at Sondrio in the Valtellina, where he taught belles-lettres at a youthful age, resided afterward in Como, and next at Milan until 1848. One of his earliest works, entitled 'Ragionamenti sulla Storia Lombarda nel Secolo XVII.' ('Lectures on the History of Lombardy in the 17th Century'), appeared in a second edition in 1842-4, and contained liberal ideas that brought upon the author the animadversion of the Austrian government, which condemned him to a year's imprisonment. During his confinement he composed a historical romance, entitled 'Margherita Pusterla' (1845), which became very popular. His great work, on which his reputation will chiefly rest, 'Storia Universale' ('Universal History'), appeared first in 1837, at Turin. It has been since revised and reprinted at Palermo and Naples, and translated into German. A French translation by Aroux and Leopardi, was published in Paris in 1843. Other works of his are: 'Storia degli Italiani' (1854); 'The Last One Hundred Years' (1864); 'The Italian Heretics' (1866-8). See Bertolini, 'Cesare Cantu e le sue opere' (1895).

Cantus Firmus, an ancient chant of the Roman Catholic Church. These chants were adopted as standing melodies, and until counterpoint was discovered, were unaccompanied, or only harmonized with octaves.

Canuck', a term sometimes used in the United States to denote a Canadian.

Canute IV., Saint, king of Denmark 1080-6. He suppressed the ancient heathen customs of his people, and thus aroused opposition; in 1085 he started on an expedition against William the Conqueror, but was murdered by rebels in his own army. He was canonized in 1101 and in the Middle Ages was considered the patron saint of Denmark.

Canute (kā-nūt') **the Great, Knud,** or **Knut,** the second king of Denmark of that name, and first Danish king of England: b. in the former country, about 995; d. Shaftesbury, England, 1035. He was the son of Sweyn, king of Denmark, and accompanied his father in his victorious campaigns in England. Sweyn, having proclaimed himself king of England, died in 1014, before his power was established, and appointed Canute his successor there. The latter was immediately driven out by Ethelred, the representative of the Saxon line, and fled with 60 ships to the court of his brother, Harold, king of Denmark. Harold enabled him to collect a large fleet in the north to prosecute his cause in England. He invaded that country anew in 1015. He fought many battles with Edmund Ironside, who had succeeded his father, Ethelred, in 1016, and was finally victorious at the battle of Assington. After this battle, Edmund and Canute agreed upon a division of the kingdom. To Canute were assigned

Mercia and Northumbria, while the Saxon prince preserved West and East Anglia. By the death of his brother, Harold, he obtained the crown of Denmark (1016). In the same year, and but one month after the ratification of the treaty of partition, Edmund died, and Canute became sole king of England without further resistance. He refrained from murdering the children of his late rival, and sent them to his half brother, Olave, king of Sweden. He put away his wife, Alfgive, the daughter of the Earl of Northampton, and espoused Emma, the widow of Ethelred, the Saxon monarch (1017), on the condition that their children should succeed to the throne of England. He made the greatest exertions to gain the affections of his English subjects, to whom his Danish origin was no recommendation. He accordingly disbanded his Danish army, retaining only a body-guard. He endeavored to blend the two races as far as possible, and to induce them to live in harmony with each other. He erected churches, and made donations to abbeys and monasteries on the scenes of former conflicts and massacres. In a witenagemote at Winchester, he compiled a code of laws which is still extant. In this code he denounced those who kept up the practice of pagan rites and superstitions, and forbade the sending of Christian slaves out of the country for sale. Although Canute generally resided in England, he made frequent visits to Denmark. He carried with him on these occasions an English fleet, English missionaries, and English artisans. He promoted three Englishmen to the newly erected bishoprics of Scania, Zealand, and Fionia. In 1025 he was attacked by the king of Sweden and defeated; but in the night, Earl Godwin, at the head of the English contingent, surprised the Swedish camp and dispersed the enemy. His absence from Denmark, and the bestowal of so many dignities in Denmark upon his English subjects, made him unpopular in that kingdom. To appease this discontent, he left behind in Denmark his son, Hardicanute, then aged 10 years, under the guardianship of his brother-in-law, Ulf (1026). In this year he made a pilgrimage to Rome. He was well received there by the Pope John, and by the Emperor Conrad II., who gave up to the Danish king all the country north of the river Eider. From the Pope he obtained privileges for the English school established in Rome, and an abatement of the sums demanded from his archbishops for the pallium; and from the various princes, relief for all English and Danish pilgrims and merchants from all illegal tolls and detentions which they had endured on their route to Rome. He returned from Rome to Denmark. In 1028 he made an expedition into Norway, expelled Olave, and restored Haco, who swore allegiance to him. In 1029 he returned to England, and his Danish subjects proclaimed Hardicanute king of Denmark. Canute immediately returned to Denmark, put down the revolt, and executed the traitor, Ulf. In 1031 Canute was acknowledged king of Norway, and laid claims to the crown of Sweden. On returning again to England, he allowed his son, Hardicanute, to share with him the Danish crown. His reign is very important in the constitutional history of Denmark. Canute issued the first national coinage of Denmark, and published the first written code of Danish law, wherein the custom of private vengeance was prohibited. He raised the clergy in their corporate capacity to a separate estate of the realm, and instituted the Thinglith or royal guard of 3,000 men. The members of this body were all men of good family, and rich enough to equip themselves at their own expense. From them sprang the Danish order of nobility; they were tried only by their peers, and formed with the king the highest court of justice. Canute's last campaign was against Duncan, king of Scotland, respecting the possession of Cumberland, but before the armies could engage the two kings were reconciled, and ancient stipulations concerning the tenure of Cumberland were renewed (1033). Canute was buried at Winchester. By Emma he had two children, namely, Hardicanute or Canute the Hardy, and a daughter, Gunhilda, married to Henry, the son of Conrad II., of Germany, emperor. By Alfgive he left two sons, Sweyn and Harold. To Sweyn was given the crown of Norway; Hardicanute retained that of Denmark, and Harold, surnamed Harefoot, took possession of that of England. Canute is most popularly known, not by his extended rule and legislative enactments, but by the familiar story of the monarch, the courtiers, and the disobedient sea.

Can'vas, a textile fabric made of the fibres of hemp; or any strong, firm cloth, whether of hemp or flax. It is chiefly used for tents, and for the sails of sailing vessels, for which its strength makes it well adapted. Varieties of it are also used as the ground of tapestry work and of oil paintings. A finer description is used for many common domestic purposes, as for towels, table-cloths, etc. Canvas for sails is made from 18 to 24 inches wide, and numbered 0 to 8, No. 0 being the thickest. A bolt is 39 to 40 yards long, and weighs 25 to 48 pounds.

Canvas-back, a widely distributed fresh-water duck (*Aythya vallisneria*), much sought as a table luxury, as its flesh is considered superior to that of all other ducks. It is about 22 inches in length and its reddish-chestnut head and neck are much shaded with dusky hues; the lower neck, breast, and forepart of the back, with the rump and tail-coverts, are black; and the back and sides gray, covered with fine lines and dots, so that the plumage resembles canvas. By reason of its similarity, this duck is frequently confounded with the red-head (q.v.). "The canvas-back is larger, its head darker, and its bill a deep black, while that of the red-head is deep blue, or a slatish color. The shape of the bill of the canvas-back is wedged and long; of the red-head moderately long and concave. . . . They are very tenacious of life, their bump of stubbornness being fully developed, and they will dive long distances, and prefer death by any other means than human agency. When one is crippled it will usually look around for an instant, to see where the danger lies, then down it goes, and if rushes or cover are near, it is good-bye to that duck,—it will not be seen again. When one is crippled it should be shot again, and at once." The food of the canvas-back consists chiefly of the roots of wild celery (*Zostera vallisneria*), which resembles the cultivated celery in appearance. It grows densely in the shallow parts of the Chesapeake Bay and Susquehanna River, about the Great Lakes, and in the Mississippi valley. Few canvas-backs are

found east of the Hudson and Delaware rivers. It is almost safe to say that where the plant grows in abundance, the canvas-back is almost sure likewise to be found; consequently the peculiarly delicate flavor of its flesh, and the market value of this duck, increase with the amount of celery it consumes, as otherwise it is hardly distinguishable from the red-head in flavor. The canvas-back breeds north of Dakota, building its nest on the ground, in a marsh, and laying from 6 to 10 greenish-buff eggs. Consult: Elliot, 'Wild Fowl of North America'; Job, 'Among the Wild Fowl.'

Canzone, kän-tsō'nā, a lyric poem, of Provençal origin. It is found in the Italian poetry of the 13th century. At first it was quite irregular, but was confined by Petrarch to more fixed and regular forms. Hence it is called canzone Petrarchesca; it is also called canzone Toscana, because it originated in Tuscany. It is divided into several stanzas, in which the nature and disposition of the verses, which are of 11 and 7 syllables, and the place of the rhymes, are uniform. The canzone usually concludes with a stanza which is shorter than the others, and is called ripresa, comgedo, comiato, signifying dismission or taking leave. There are different kinds of canzoni, and different names are given to the different parts. The canzone Anacreontica is divided into small stanzas, consisting of short verses, with a regular disposition of the rhymes through all the stanzas. Not only light, pleasing songs of love, gaiety, and mirth, but poems on solemn and lofty subjects, and of an elevated dithyrambic strain, are included under this name. The latter subjects, however, are better adapted to the canzone Pindarica, which was first introduced in the 16th century, by Luigi Alamanni, and owes its perfection chiefly to Chiabrera. It is distinguished from that of Petrarch by a bolder flight, loftier ideas, greater freedom in the choice and disposition of the verses, and by the form of the stanzas, which is borrowed from the Greek chorus. The Pindaric canzoni are divided into strophe, antistrophe, and epode, and are called canzoni alla Greca. Those divisions are sometimes called ballata, contraballata, and stanza; or volta, rivolta, and stanza; the Greek names are the most common. There is also the canzone a ballo, an old Italian poem, originally intended to be sung at a dance (ballo). It is called also ballata. It is not employed by the Italian poets later than the 16th century.

Canzonet, kän-tsō-nĕt', **Canzonetta,** in Italian poetry a canzone (q.v.), consisting of short verses, much in use with the poets of the 15th century. Rinuccini, and after him Chiabrera, have used it in modern times, and given it more grace. Canzonets are generally expressive of tender feelings. In music, canzonet signifies a song, shorter and less elaborate than the aria of the oratorio or opera.

Caonabo', kä-o-nä-bō', Indian chief of Hispaniola (Haiti) at the time of its discovery by Columbus. The latter built a fort which he called La Navedad, and in which he left, when sailing for Spain early in 1493, a garrison of 40 men — among them one Irishman and one Englishman, as shown by Navarrete's list. Returning before the end of the year, he found that Caonabó had burned the fort and killed the garrison. According to the account of a friendly native, the Spaniards had drawn this fate upon themselves by their evil conduct. It has been suggested, as a reason for special regret, that we might otherwise have had from the Englishman or the Irishman an eye-witness's description of the first voyage of Columbus, in our own language. In 1494 the Indians in great numbers attacked the Spaniards, having been provoked by the misconduct of one of the lieutenants of Columbus, Pedro Margarite. Columbus overthrew them, first at Magdalena, and later (1495) on the plains of the Vega Real — where, tradition has it, 100,000 hostiles were assembled. Caonabó meanwhile threatened the garrison of St. Thomas. Alonso de Ojeda was sent by Columbus to cajole Caonabó into coming to a conference. Ojeda went alone among the hostiles. As presents he took gyoes and manacles of shining metal; treacherously persuaded the prince to show himself to his subjects wearing these novel ornaments, and even, while thus adorned, to ride Ojeda's horse; then, mounting also, he dashed through the crowd of savages and carried his victim into the presence of Columbus. Sent to Spain for trial, Caonabó died in 1496.

Caoutchouc, koo'chook, an elastic, gum-like substance, obtained from the juice of certain tropical trees and shrubs, and commonly known as India-rubber or «rubber.» The best caoutchouc comes from the Para region, in Brazil; but supplies are also obtained from Central America and the West Indies, from Africa, and from tropical Asia. The details of collecting the juice and preparing it for market vary somewhat according to the locality, and with the nature of the trees or shrubs from which the juice is obtained. In the Amazon region, when the source is a tree, incisions are made in the bark each morning, and the milky sap that exudes is collected in little tin or clay cups that are secured to the tree for the purpose. At the end of about 10 hours these are emptied into larger collecting vessels, and on the morning of the following day new incisions are made in each tree, some eight inches below the first ones. This process is continued until incisions have been made in the bark from a height of about six feet down to the ground. The poorest quality of sap is obtained from the highest wounds, and the best from the lowest ones. To evaporate the juice, a fire is first built of materials that yield dense volumes of smoke. A workman then dips a wooden paddle into the collected sap, after which he holds it in the smoke until the sap solidifies and acquires a slight tinge of yellow. He then dips the paddle into the sap supply again, repeats the smoking process, and so proceeds until the paddle is covered with a layer of the dried gum that is perhaps an inch and a half thick. He then slits this layer, removes it from the paddle, hangs it up to dry, and starts a fresh evaporation.

Pure caoutchouc from Para is light-colored below the surface, but superficially it is dark brown from oxidation. It has a specific gravity of about 0.92, and consists chiefly of carbon and hydrogen in the proportion of about 87 per cent of carbon to 13 of hydrogen. Small quantities of oxygen are always present, however, as the best of the Para product contains as much as one half of 1 per cent of a sort of resin that

contains oxygen, and is undoubtedly produced by the oxidation of the gum. In fact, it is known that caoutchouc will oxidize slowly in damp air, even after it is vulcanized, and particularly when exposed to the action of light. Caoutchouc consists, apparently, of two different kinds of gum, one of which is fibrous, while the other is viscous, though the two are chemically identical. It is slightly soluble in ether, turpentine, chloroform, petroleum, naphtha, benzene, and carbon disulphide, the viscous portion being more soluble than the fibrous part. At 250° F. caoutchouc begins to melt, and becomes permanently transformed into a sticky substance which retains its peculiar consistency almost indefinitely. At 400° F. the transformation is more complete, and the black, adhesive mass that results makes an excellent lute for sealing glass bottles and jars if it is thoroughly incorporated with 50 per cent of its own weight of dry slaked lime. By careful destructive distillation caoutchouc is resolved into a number of hydrocarbon oils that are of interest to the chemist.

As early as 1615 the Spaniards used the crude gum "for waxing their cloaks, which were made of canvas, so as to make them resist water." But it was not until about 200 years later that caoutchouc began to attract general attention in such ways. At first it was applied to cloth by the aid of heat; but improved methods followed the discovery of solvents for the gum, and the invention, by an Englishman named Thomas Hancock (about 1820), of the "masticator," a machine by which the caoutchouc is thoroughly worked over and brought to a uniform consistency. But the greatest step in the development of the rubber industry was the discovery of the process of vulcanization,—a discovery that appears to have been made independently and at about the same time (1843) by Charles Goodyear, of New Haven, Conn., and Thomas Hancock, to whom reference has previously been made. The credit of priority belongs to Goodyear, but Hancock did a great deal to make the discovery a commercial success. Unvulcanized caoutchouc is softened by heat, and is made hard and inelastic by cold; but upon being vulcanized the gum becomes comparatively insensible to ordinary extremes of temperature, and also has its elasticity materially increased. The process of vulcanization depends upon the fact that the crude rubber will absorb sulphur, and combine with it at a temperature that is easily attainable without injury to the product. The details of the vulcanization differ somewhat, according to the nature of the article that is being manufactured. If sheet rubber is submerged for a few moments in melted sulphur at a temperature of 250° F., it absorbs about one tenth of its weight of that element; but although its color changes somewhat it is otherwise apparently unaltered. Upon exposure for a somewhat longer time to a temperature of 285° F., however, true combination of the sulphur and caoutchouc ensues, and the gum is said to become "vulcanized." It is not necessary that the sulphur should be actually melted in order that the sheet rubber may absorb it, for sheets that are laid in powdered sulphur that is heated nearly to its melting-point will absorb the proper amount for good vulcanization in the course of a few hours. Vulcanization of rubber sheets can even be brought about without the action of heat, by dipping the sheets for a few seconds in a solution of chloride of sulphur in carbon disulphide. It is more common, however, to knead the requisite amount of sulphur directly into the caoutchouc by mechanical means. The article to be manufactured is then brought into shape by the action of pressure and moderate heat (or in any other manner), and the final operation consists in heating it to the vulcanizing temperature by the aid of a steam bath. Chemically considered, the process of vulcanization appears to consist in the substitution of one or more sulphur atoms for a portion of the hydrogen of the hydrocarbons of which the caoutchouc is composed. See INDIA RUBBER; RUBBER MANUFACTURE.

Cap, the cover of the end or head of anything. Caps were not worn by the Romans for many ages. When either the rain or sun was troublesome the lappet of the gown was thrown over the head; and hence all the ancient statues appear bareheaded, excepting sometimes for a wreath or the like. The same usage prevailed among the Greeks, to whom, at least during the heroic age, caps were unknown. The sort of caps or covers of the head in use among the Romans on divers occasions were the *pitra, pileus, cucullus, galerus,* and *palliolum,* which are often confounded by ancient as well as modern writers. The general use of caps and hats is referred to the year 1449. The first seen in Europe were used at the entry of Charles VII. into Rouen. From that time they began to take the place of *chaperons* or hoods. When the cap was of velvet they called it *mortier;* when of wool simply *bonnet.* None but kings, princes, and knights were allowed to use the *mortier.* The cap was the head-dress of the clergy and graduates. Pasquin says that it was anciently a part of the hood worn by the people of the robe; the skirts whereof being cut off, as an incumbrance, left the round cap an easy commodious cover for the head; which cap, being afterward assumed by the people, those of the gown changed it for a square one, first invented by a Frenchman called Patrouillet. He adds, that the giving of the cap to the students in the university was to denote that they had acquired full liberty, and were no longer subject to the rod of their superiors, in imitation of the ancient Romans, who gave a *pileus* to their slaves in the ceremony of making them free: whence the proverb *vocare servos ad pileum:* hence, also, on medals, the cap is the symbol of Liberty, who is represented holding a cap in the right hand by the point.

Cap of Maintenance, one of the ornaments of state carried before the sovereigns of England on the occasion of their coronation. It is also applied to an ornament borne before the mayors of certain cities on state occasions, and to a device in heraldry.

In ship-building a cap is a square piece of timber having two holes cut through it,—one square to fit on the squared or tenon head of the lower mast; the other round, to take the heel of the upper mast. Also a similar contrivance affixed to the end of the bowsprit, through a round hole in which the jib-boom is rigged.

In mining, a mass of unproductive rock overlying valuable ore; and in physical geography,

a similar mass, as of ice overlying the surface of a country; as, the ice-cap of Greenland.

For the term as used in military parlance, see PERCUSSION CAP.

Capacity, Specific Inductive, a term introduced by Faraday, the discoverer of the property, to denote the relative powers or capacities of insulating media, called by him dielectrics, for transmitting electrostatic inductive influence. When an electrified body is brought near to a non-electrified conductor, an electric disturbance takes place at the surface of the latter, electricity of the kind opposite to that which the charged body possesses being attracted and the opposite kind being repelled. This disturbance is said to be due to *induction*. (See INDUCTION, ELECTROSTATIC.) Faraday discovered that it depends for intensity on the nature of the insulating medium between the two bodies, showing that, other things remaining the same, the disturbance is greater with some media than with others. The view that Faraday took of induction was altogether opposed to that which was held previous to the time of his investigations, and which was expressed by speaking of induction as action of electricity at a distance: and by experiments on liquid insulators, and in other ways, he proved that what was looked on as influence at a distance is really an influence transmitted by means of the intermediate particles of the insulating substance. The medium he termed the *dielectric*. He showed that the particles of the dielectric are in a polarized condition when it is exposed to electric force. (For a full exposition of Faraday's theory of induction see INDUCTION, ELECTROSTATIC.)

In order to compare the inductive capacities of various substances, Faraday made use of the fact that the capacity for electricity of a Leyden jar depends on the inductive capacity of the insulator which separates the interior and exterior coatings. He constructed two spherical Leyden jars precisely similar, so far as the conductors were concerned, but arranged so that the insulating medium might be varied. Having charged one of the jars he connected the other to it, the inside coatings together and likewise the outside coatings. Part of the electricity in the charged jar under these circumstances passes into the uncharged jar; and the jars being identical in form, it is divided between the two jars in proportion to the inductive capacities of their respective insulators. By determining the quantity in each jar the inductive capacities of the insulators are compared.

Faraday found that all the gases he experiment d on have the same inductive capacity. He took common air as the standard of reference, and found the following numbers to represent the specific inductive capacities of the various substances compared with it:

Air	1.00	Wax	1.86
Spermaceti	1.45	Glass	1.90
Resin	1.76	Shell-lac	2.00
Pitch	1.80	Sulphur	2.24

Later investigations on specific inductive capacity have been made with a "platimeter," devised by Sir William Thomson (Lord Kelvin), and are far more accurate than any that could be made with Faraday's apparatus.

Capa'neus, one of seven legendary heroes who warred against Thebes, killed by Jupiter.

Cap-à-pie, kăp-ą-pē (O. Fr. *de cap à pie;* Mod. Fr. *de pied en cap*), a term signifying from head to foot, and used with reference to a complete suit of armor covering the body of a knight at all points; as, "He was armed cap-à-pie for the encounter."

Cape Ann, Mass., the southeast point of the town of Gloucester, Mass., the northern limit of Massachusetts Bay; in lat. 42° 38′ N., and lon. 70° 34′ W. The whole of the rocky peninsula forming this part of Gloucester is also called Cape Ann, including the village of Squam in its northeastern part. This peninsula is a headland of sienite, which forms low hills, over the surface of which the rock is very generally exposed to view. Valuable quarries of sienite for building purposes are worked most conveniently for shipment. The place is much exposed to the prevalent northeast storms; but it offers a small, well-sheltered harbor among the rocks, where coasting vessels often take refuge. There are on the shores of this harbor two fixed lights.

Cape Ann Settlement, the first within the limits of the Massachusetts Bay territory. In 1622, the New England Company, to push the settlement of its grant and give it some value, divided the land in severalty among its members. The region about Cape Ann fell to Edmund, Lord Sheffield, who sold a patent for it in 1624 to Robert Cushman and Edward Winslow of the Plymouth colony. They found some English hunters and fishers who had been there since the year before; these acknowledged the rights of the Plymouth people, and the two parties planted and fished amicably; but shortly after a London vessel which had taken up the quarrel of the firebrand, Rev. John Lyford, seized the Plymouth men's fishing stage. Miles Standish came up from Plymouth to settle the trouble by force, but against his wish, the settlement compromised the matter by the crew agreeing to build them another stage. In 1624 Winslow's company sold the site of Gloucester to the "Dorchester Adventurers," an unincorporated English joint-stock company recently formed. These had anticipated the bargain by sending out a band of settlers the fall before, with live stock, implements, etc., and they made Thomas Gardner overseer. The attempt was unsuccessful, and in 1625 the Dorchester company engaged Roger Conant, then at Nantasket with Lyford, to be governor, Lyford to be minister. But the next year the "Adventurers" dissolved, and most of the settlers went home; the few remaining ones removed to "Nahumkeike" (Naumkeag), and founded Salem.

Cape Ar'ago, a cape on the western coast of Oregon, on the south of Coos Bay. Its lighthouse, which is on a small island, is in lat. 43° 20′ 38″ N., and lon. 124° 22′ 11″ W., and shows a white, flashing light.

Cape Bab-el-Mandeb. See BAB-EL-MANDEB.

Cape or Point Barrow. See BARROW, CAPE OR POINT.

Cape Blanco, Africa. See BLANCO, CAPE.

Cape Blanco, Oregon, a cape forming the most western point of the State, situated in lat. 42° 50′ N., and lon. 124° 32′ W. It has a lighthouse with a white fixed light, 256 feet above sea-level.

Cape Boeo, bō-ā'ō, the ancient *Lilybæum Promontorium,* a cape, on the western coast of Sicily, one mile from Marsala. It is the point of Sicily nearest to ancient Carthage, and at an early period became an important naval station. The naval victory of the Romans over the Carthaginians, which put an end to the first Punic war, was gained near this point.

Cape Bojador, bŏj-ą-dōr'. See BOJADOR, CAPE.

Cape Bon, or **Ras Adder,** a headland of Tunis, on the Mediterranean, forming the northernmost point of Africa, in lat. 37° 6′ N., and lon. 11° 3′ E.

Cape Breton, bret'ŭn, Canada, an island of the Dominion of Canada, separated from Nova Scotia, to which province it belongs, by the narrow Gut or Strait of Canso; area 3,120 square miles; length about 110 miles. It is of very irregular shape, the Bras d'Or, an almost landlocked arm of the sea (with most picturesque scenery), penetrating its interior in various directions, and dividing it into two peninsulas connected by an isthmus, across which a canal has been cut. The surface is rather rugged, and only small portions are suited for agriculture; but it possesses much timber, valuable minerals (several coal mines being worked), and the coast abounds in fish. Timber, fish, and coal are exported. The island belonged to France from 1632 to 1763, and Louisburg, its capital, was long an important military post. It was separate from Nova Scotia between 1784 and 1820. The chief towns are Sydney and Arichat. Pop. (1901) 97,190.

Cape Canav'eral, a cape on the eastern coast of Florida, in lat. 28° 27′ N., and lon. 80° 33′ W. There are dangerous shoals at this point, and navigation is protected by a revolving light.

Cape Canso, the eastern extremity of Nova Scotia, at the entrance of Chedabucto Bay, in lat. 45° 19.5′ N., and lon. 60° 55′ W.

Cape Car'thage, a headland on the northeast coast of Tunis, jutting out into the Mediterranean. Traces of the ancient city of Carthage are found on it to the north of the Tunis lagoon.

Cape Catoche, kā-tō'chā, a headland at the northeastern extremity of the peninsula of Yucatan, Central America, in lat. 21° 34′ N., and lon. 86° 57′ W. It was on this spot that the Spaniards first landed on the American continent.

Cape Charles, a cape at the northern entrance of Chesapeake Bay, forming the southern extremity of Northampton County, Va., in lat. 37° 07′ N., and lon. 75° 53′ W. Northeast of it, on Smith's Island, is a lighthouse with a revolving light.

Cape Clarence, a headland at the northern extremity of Jones' Sound, Baffin Bay. It is surrounded by inaccessible mountains whose summits are covered with perpetual snow.

Cape Clear, a headland forming the southernmost extremity of Ireland, in lat. 51° 26′ N., and lon. 9° 29′ W. It is on an island of 1,506 acres, with a lighthouse on an abrupt cliff 455 feet high.

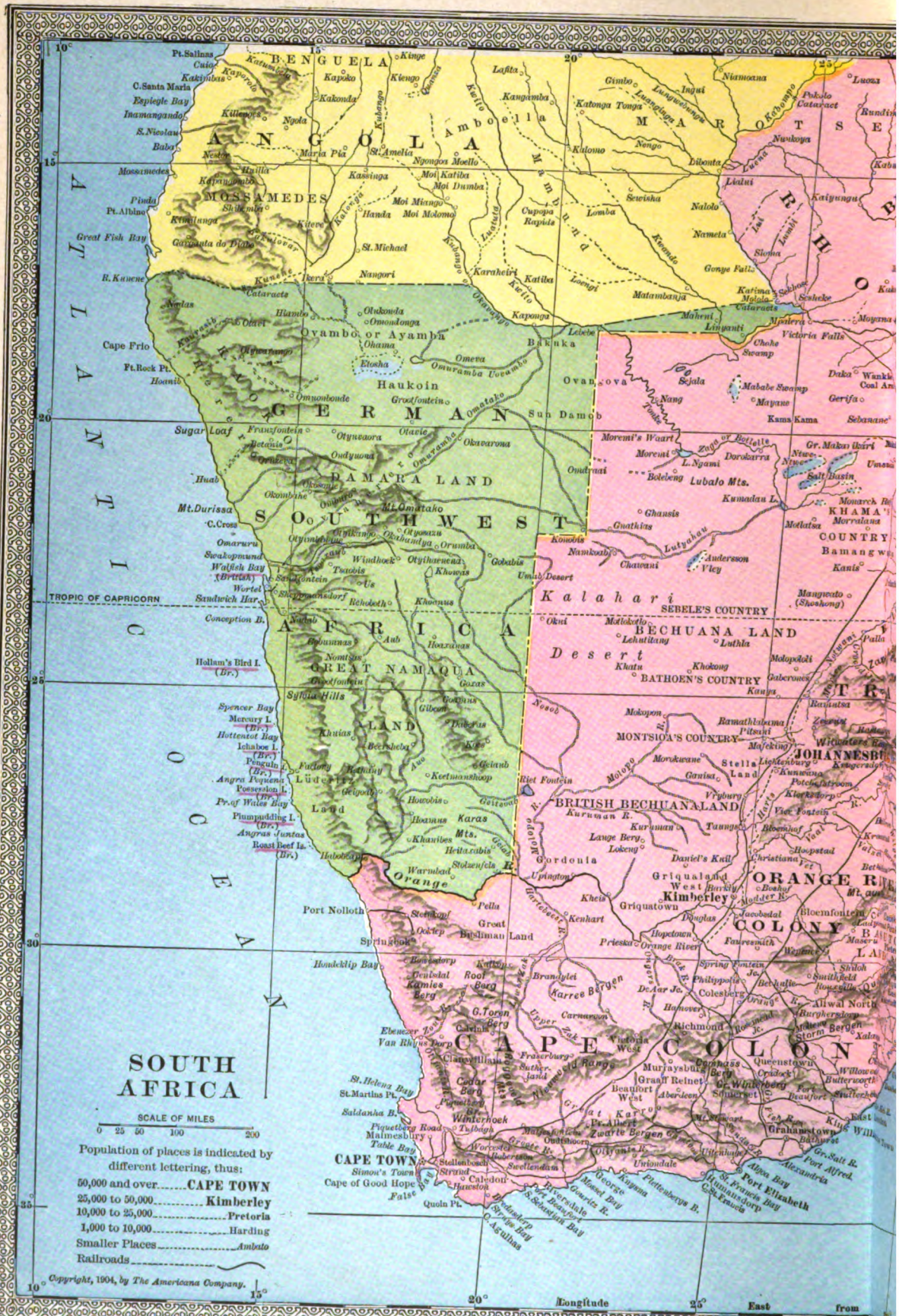
Cape Coast Castle, a town and fort of western Africa on the Gulf of Guinea, in the British colony of the Gold Coast, in lat. 5° 5′ N., and lon. 1° 13′ W. The place lies in a chasm, and is defended by the great castle near the water's edge, and by three small forts on the hills behind, one of which serves as a lighthouse and signal station. With the exception of a few houses for Europeans, the town consists of straggling lines of mud huts, with clusters of palm-trees and an occasional tamarind attached. It is a principal mart for native trade. It is connected by telegraph with Accra (the capital), and by road with Prahsue. The climate is unhealthy; mean temperature, 78°. The principal exports are gold-dust, ivory, and palm-oil. Cape Coast Castle was ceded by the Dutch to the English in 1665, and from 1672 was possessed by several British African companies till 1843, when it was taken over by the British government. Pop. about 12,000.

Cape Cod, a cape and peninsula on the coast of Massachusetts, on the south side of Massachusetts Bay, forming the county of Barnstable; lat. of the cape, 42° 3′ N., lon. 70° 15′ W. The peninsula is 65 miles in length and from 1 to 20 in breadth, and is in the form of a man's arm, bent inward both at the elbow and the wrist. Though mostly sandy and barren, it is nevertheless populous; and the inhabitants derive their subsistence chiefly from the sea. The best harbor on the peninsula is at Provincetown. There is a lighthouse known as the Highland Light, on the northeast shore and one at Race Point almost directly west of the former. The navigation around the cape is peculiarly baffling, and hazardous, and the saving to commerce and human life which would result from a short-cut waterway would be great. A proposition to cut a canal from Buzzard's Bay to Barnstable Bay dates from the early part of the 17th century, but nothing was actually done until 1878, when a charter was granted by the legislature of Massachusetts, a company was formed, and work begun. The cape was discovered 15 May 1602 by Bartholomew Gosnold, who gave it its name from having taken a great quantity of codfish near it. In 1620 the Pilgrims of the Mayflower made a temporary landing at the site now occupied by Provincetown.

Cape Cod, a book of travel and description by Henry D. Thoreau, published in 1865. Until Thoreau arrived to make acquaintance with its hard yet fascinating personality, Cape Cod remained unknown and almost unseen, though often visited and written about by tourists and students of nature. Something in the asceticism, or the directness, or the amazing keenness of Thoreau's mind brought him into sympathetic understanding of the thing he saw, and he interpreted the level stretches of shore with absolute fidelity. In this, as in his other books, Thoreau rises from the observation of the most familiar and commonplace facts, the comparison of the driest bones of observed data, to the loftiest spiritual speculation, the most poetic interpretation of nature.

Cape Colon'na. See SUNIUM.

Cape Colony, a British colony at the southern extremity of Africa, washed on the west, south, and east by the ocean, and having on the north and northeast the German terri-


SOUTH AFRICA
SCALE OF MILES
0 25 50 100 200
Population of places is indicated by different lettering, thus:
50,000 and over..... CAPE TOWN
25,000 to 50,000..... Kimberley
10,000 to 25,000..... Pretoria
1,000 to 10,000..... Harding
Smaller Places..... Amato
Railroads
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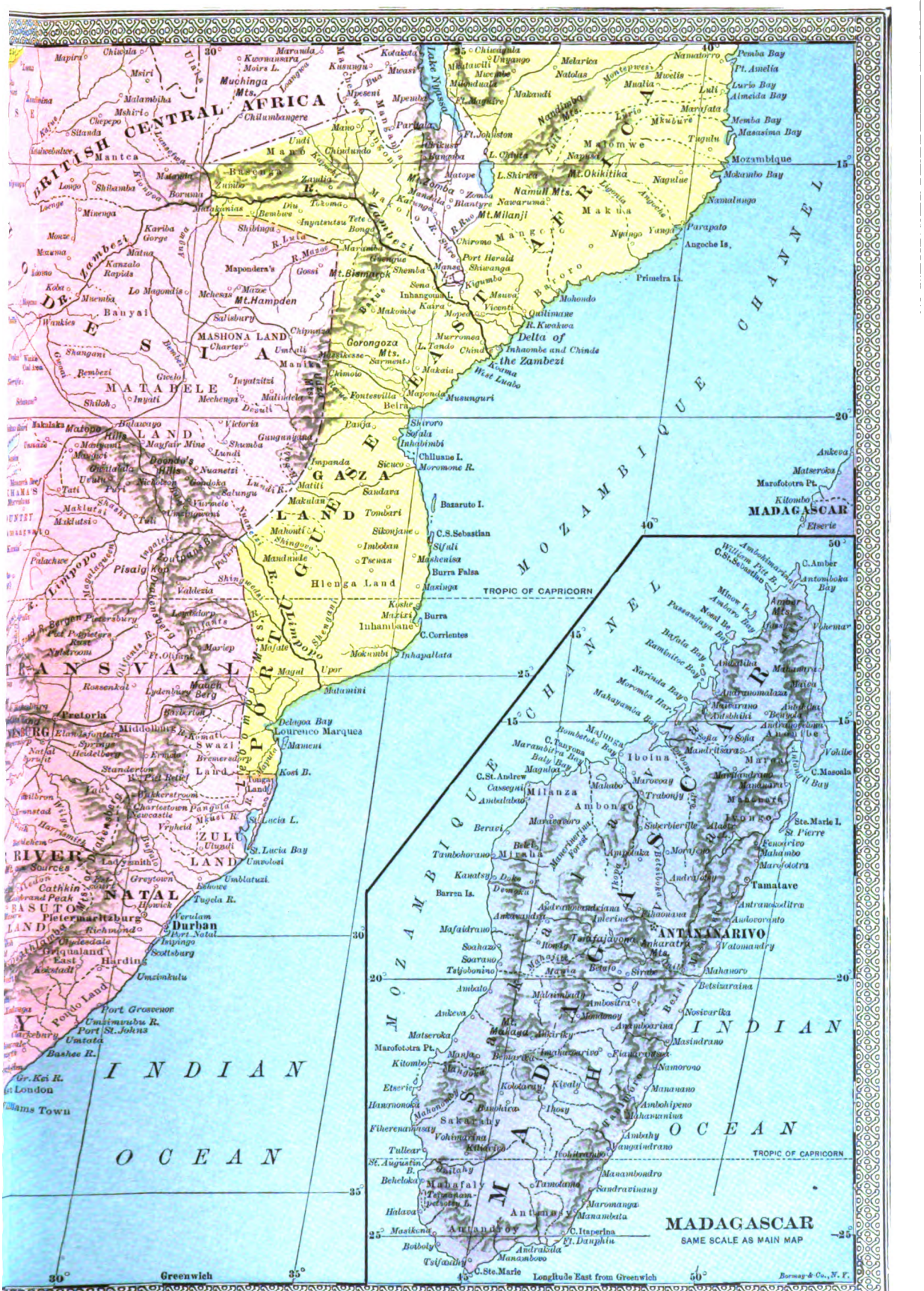
ANGOLA
BENGUELA
MOSSAMEDES
GERMAN SOUTHWEST AFRICA
BECHUANALAND
BRITISH BECHUANALAND
KHAMA'S COUNTRY
MATABELE COUNTRY
MASHONA COUNTRY
ORANGE RIVER COLONY
CAPE COLONY
NATAL
ZULULAND
PORTUGUESE EAST AFRICA
Kalahari Desert
Great Namaqua Land
Damara Land
Ovamboland
Bakuba
Barotse
Lunda
Ambaca
Malange
Kassanje
Kimbundu
Kuanhama
Kuanyama
Ovambo or Ayamba
Haukoin
Sun Damob
Ovangova
Lubalo Mts.
Sebasane
Lobengula
Gungunhana
Sebituane
Sekeletu
Sekhome
Khama
Bathoen
Sebele
Linyanti
Victoria Falls
Zambesi R.
Kafue R.
Luapula R.
Lake Bangweolo
Lake Mweru
Lake Tanganyika
Lake Nyassa
Shire R.
Chambezi R.
Kafukwe R.
Loangwa R.
Luangwa R.
Lualaba R.
Lake Dilolo
Lake Ngami
Lake Liambezi
Lake Ngwashi
Lake Shirwa
Lake Chiuta
Lake Amaramba
Lake Kamalondo
Lake Kamalampeu
Lake Banguelo
Lake Moero
Lake Kisale
Lake Kabele
Lake Kabwe


BRITISH CENTRAL AFRICA
MASHONA LAND
MATABELE LAND
GAZA LAND
PORTUGUESE EAST AFRICA
MOZAMBIQUE CHANNEL
TRANSVAAL
ZULU LAND
NATAL
BASUTO LAND
INDIAN OCEAN
TROPIC OF CAPRICORN
Lake Nyassa
Zambezi R.
Limpopo R.
Delta of the Zambezi
Lourenco Marques
Durban
Pietermaritzburg
Pretoria
Beira
Quelimane
Inhambane
Tamatave
ANTANANARIVO
MADAGASCAR
SAME SCALE AS MAIN MAP
Longitude East from Greenwich
Greenwich
Bormay & Co., N. Y.

tory of Great Namaqualand, the British territory of Bechuanaland, the Orange River Colony, Basutoland (British), and the colony of Natal. A considerable portion of the boundary on the north is formed by the Orange River. The colony extends about 450 miles from north to south, and 600 from east to west; the coast line is about 1,300 miles. The area is 276,000 square miles. The principal indentations of the coast are St. Helena, Saldanha, Table, False, Walker, Mossel, Plettenberg, St. Francis, and Algoa bays.

In the interior almost every variety of soil and surface is found, but a great part of the colony is arid and uninviting in appearance. Several ranges of mountains, running nearly parallel to the southern coast, divide the country into successive terraces, rising as they recede into the interior, between which lie belts of fertile land, or vast treeless and barren-looking plains. One of these, called the Great Karoo, is 300 miles long and 100 broad, and presents a desolate appearance, having a dry and often baked soil, with small shrubby plants scattered over it. Yet these plains make valuable sheep-walks, the flocks thriving exceedingly well upon the scanty vegetation; and the soil, where water can be obtained by collecting the rain, is generally very fertile. Large reservoirs have been constructed in many places, and permanent homesteads established where formerly flocks could only be maintained for a month or six weeks at a time. The principal and farthest inland mountain terrace averages 6,000 or 7,000 feet in height, and, commencing in Namaqualand, runs eastward under the names of Roggeveld, Nieuwveld, Sneeuwbergen, Stormbergen, etc., to the northeast frontier. The culminating point is the Compass Berg, over 8,000 feet high. The Table Mountain at Cape Town is a stupendous mass of naked rock, rising almost perpendicularly, about 3,585 feet in height. The colony is deficient in rivers, though in this respect the eastern half is more favored than the western. The Orange River is the largest in this part of Africa, but is of little or no use for navigation. Others are the Elephants or Olifants River, flowing into the Atlantic; the Gauritz, Gamtoos, Great Fish, Sunday, and Great Kei, emptying themselves into the sea on the south and southeast.

The most valuable mineral product is diamonds; copper ore is largely exported; coal is mined, and iron ore, gold, amethysts, agates, etc., are found. The bulk of the diamonds that come into the markets of the world in the rough state are now obtained from Cape Colony. The great mining centre is Kimberley, in the far north of the colony, about 10 miles from the Vaal River, and near the frontier of the Orange River Colony. So far as is known, the first of the South African diamonds was casually picked up in 1867, and soon after several others were found, including a fine large stone known as the "Star of South Africa." By the early part of 1870 so many diamonds had been found that a rush of people to the diamond district began to take place, and the banks of the Vaal were soon covered with thousands of diggers. At first the precious stones were found on or near the surface, but subsequently it was discovered that they were to be found deeper down, and latterly they have been obtained many hundreds of feet below the surface, great open excavations having been made at the localities where they are plentiful. The richest mine has been the Kimberley mine, situated in the centre of the town of the same name, which sprang up around it. For the first hundred feet in depth the diamonds were found embedded in a soft, friable, yellowish earth; below that the soil changed to a slaty-blue color, and was of a firmer consistency, and the diggers then thought that the bottom of the mine had been reached. It was soon discovered, however, that the blue ground yielded as many diamonds as the yellow, if not more, and this productivity has still continued. Another famous mine is the De Beers mine. Both these mines have yielded a remarkable number of large stones, but a great many of the diamonds have been "off-color," that is, yellow, spotted, or otherwise defective in water or lustre. One of the finest yet found in South Africa is the "Porter Rhodes," a beautiful stone weighing 150 carats, and valued at $300,000 One much larger, a yellow stone, weighing 302 carats, was found in 1884, and a still larger, weighing 428½ carats, was found in the De Beers mine in 1888. The largest in the world, weighing 971 carats, but with a large flaw, was found in the Orange Free State in 1893. Although mining operations have been carried on at great expense, owing to the depths to which the workings have been sunk (some 600 feet or more), the profits of the companies which latterly have owned the mines have been enormous. The rough work has been done almost entirely by the native Africans, of whom 10,000 or 11,000 have been in employment in the mines at one time. Very stringent regulations have had to be enforced to prevent theft of the precious stones, and also illicit dealing in stones unlawfully acquired.

The climate is very healthy and generally pleasant, though in summer the heat is great in some parts. The mean temperature for the year at Cape Town is about 62°. The climate of the dry and elevated inland districts is considered remarkably suitable for persons of consumptive tendency, and many have been attracted to the colony on this account.

Except along the coast line, especially the southeast coast district, where there are extensive forests, timber is scarce. There are upward of a hundred different kinds of woods, however; many of them extensively employed for such purposes as house-building, wagon-making, and furniture- and cabinet-work. With irrigation, trees can be grown anywhere. The aloe and the myrtle attain a great size.

The quadrupeds of the colony comprise the African elephant, still found in the forests of the south coast region; the buffalo, equally restricted in locality; the leopard, jackal, hyæna, numerous antelopes, baboon, aardvark, etc. Lions, at one time numerous, are not now to be met with in the colony, nor is the giraffe. The birds include vultures, eagles, and other *Raptores* (the most remarkable of which is the serpent-eater), pelicans, flamingoes, and most important of all, the ostrich, now bred as a domestic animal for the sake of its feathers, those plucked from an adult bird in a season being sometimes worth from $50 to $90. Other native animals are large snakes, the venomous cobra di capello, and the scorpion. Along the

coast whales and seals abound, and salt- and fresh-water fish are plentiful.

The colony is better adapted for pasturage than for agriculture, but wheat, maize, and other cereals can be grown almost everywhere, the only drawback to their cultivation being the want of moisture in certain localities and in certain seasons. In some years a surplus of grain is left for exportation; in others grain has to be imported. All kinds of European vegetables and pot-herbs, and all the fruits of temperate climates, such as apples, pears, plums, peaches, melons, apricots, walnuts, almonds, oranges, limes, etc., thrive excellently, and fruits, dried and preserved, are exported. The vine is cultivated, and some excellent wines (notably those of Constantia) are made. The colony is said to be particularly well suited for grape-culture, and the vines produce heavier crops than are known almost anywhere else. Viticulture, it is believed, is yet only in its infancy, though there are already over 90,000,000 vine-stocks. The colonial government has up to 1899 disposed of 128,000,000 acres of land, the quantity remaining undisposed of being 49,564,000 acres.

Sheep-raising is the most important industry, and wool the chief export (although surpassed in value by diamonds). The amount of this article exported to the United Kingdom in 1899 was 84,032,536 pounds. Most attention is now devoted to the breeding of pure merinoes, the consequence being a great improvement in the wool. Goats are also bred, both the native and the Angora, and the export of goats' wool or hair to Great Britain has increased from 102,570 pounds in 1868 to 12,948,574 pounds in 1899. Cattle-breeding is carried on to some extent, especially along the coasts and in the eastern and northern districts.

There are no manufactures of any importance, and consequently the imports of the colony consist largely of manufactured goods, chiefly from Great Britain. The total imports in 1898–9 were of the value of $83,652,000; in 1871 their value was $15,173,014; exports in 1898–9 amounted to $131,265,250, in 1871 to $16,422,083. The value of the gold exported in the year 1898–9 was $83,735,250; of diamonds, including those sent through the postoffice, $22,145,100. The total value of the diamonds exported from 1867 to 1898 was $226,800,000. The other exports of importance, besides wool, are ostrich feathers, copper ore, skins, and hides. The exports of merchandise to Great Britain in 1899 amounted to $45,274,887, the imports of British produce to $40,645,654. To facilitate the inland traffic numerous roads have been made (the lotal length within the colony proper amounting to 8,000 miles), while 2,700 miles of railway and 7,500 miles of telegraph have been opened. Lighthouses have been built round the coast, and harbor works constructed.

The coinage is that of Great Britain, as are also the weights and measures, except that for land the *morgen* = 2.116 acres is employed.

The constitution formed under the acts of 1853, 1865, and 1872 vests the executive in the governor (who is also commander-in-chief of the forces) and an executive council or ministry composed of certain office-holders appointed by the Crown. The legislative power is in the hands of a legislative council of 23 members, elected for seven years, over which the chief justice presides *ex officio*, and a House of Assembly of 95 members, elected for five years, representing the country districts and towns of the colony. The public revenue for 1897–8 was $34,979,292; the expenditure, $40,891,280; the public debt amounts to about $145,500,000. The revenue is chiefly derived from railways, customs duties, and taxes. Much the greater portion of the debt represents money spent on the construction of railways.

The European population consists in part of English, Scottish, and Irish settlers and their descendants, but the majority is of Dutch origin (see BOERS), with a considerable number of German origin. The colored people are chiefly Hottentots, Kaffirs, Bechuanas, Basutos, Griquas, Malays, and a mixed race, the offspring of black women and white fathers. The laborers are chiefly Hottentots and Kaffirs. The prejudices and ill feeling once subsisting between the different nationalities of which the population is made up are now fast disappearing. Education is advancing, though it is not compulsory. The returns show a steady increase in the numbers of children of all classes receiving instruction. For the higher education there are seven colleges, besides a university (at Cape Town) incorporated in 1873. The colleges have each a staff of instructors in classics, mathematics, science, etc., but the university is merely an examining and degree-conferring institution. The religious bodies in the colony with the greatest number of adherents are the Dutch Reformed Church, the Church of England, the Methodists, Independents, and Presbyterians, in the order here given. There is no Established Church.

The chief towns of the colony ranking after Cape Town are Port Elizabeth, Kimberley, and Graham's Town (qq.v.).

The Dutch, who had early fixed upon the Cape as a watering-place for their ships, first colonized it under Van Riebeek in 1652. Reducing the Hottentot inhabitants to slavery, or driving them beyond the mountains, they extended the Cape settlement over a pretty large area. But the colony was under the rule of the Dutch East India Company, and owing to their regulations, made very slow progress. It was captured by the British in 1795, restored at the Peace of Amiens (1802), and again taken in 1806, Sir David Baird being sent at the head of an expedition to take possession of it, and so prevent it from falling into the hands of the French. From this time it has remained in the possession of the British, to which it was formally assigned in 1815, along with Dutch Guiana, Holland receiving in return £6,000,000. It now began to advance in prosperity, but the progress of the colony was greatly retarded by the Kaffir wars of 1834, 1846, and 1851–3, the result of the depredations of this warlike race. Subsequently the area of the colony was gradually enlarged by the annexation of surrounding districts. The most important of these annexations were British Kaffraria (annexed 1866); Griqualand West (1876); Kaffraria proper, or the Transkeian districts (Transkei proper, Griqualand East, and Tembuland), including nearly the whole of the region between the Kei and the Natal border (1875–80); Pondoland (1894); and part of Bechuanaland (1895). Its most recent history has been connected with the war between Great Britain and the Boer republics. See BOERS; SOUTH AFRICAN WAR.

Cape Comorin, kŏm'ō-rĭn, the most southern extremity of the peninsula of Deccan, British India, in lat. 8° 5′ N., and lon. 77° 30′ E., forming a circular, low, sandy point, which is not discernible above the distance of 12 to 16 miles from the deck of a large ship. Eighteen miles north from the cape is a bold summit called Comorin Peak, the southern termination of the western Ghauts, which has, from a distance, been often taken for the cape itself. Within a short distance of the cape lies a rocky islet, high above water; and about three miles from this islet are a fort and a village, a few fishermen's houses, a church, and some ancient temples, being the remains of the once famous town of Cape Comorin.

Cape Diamond, the extremity of an abrupt promontory in the province of Quebec, Canada, at the junction of the St. Charles and St. Lawrence rivers. On the promontory stands the citadel of Quebec, and on the west and nearly on a level with the ramparts lie the Plains of Abraham. Here was gained in 1755 the memorable victory by the English under Wolfe, over the French under Montcalm.

Cape Disappointment, or **Cape Hancock,** a cape at the mouth of the Columbia River, forming the southwest point of the State of Washington, in lat. 46° 16′ N., and lon. 124° 2′ W. There is a lighthouse at this point with a fixed light.

Cape Ducato, doo-kä'tō, the southern extremity of Santa Maura, one of the Ionian islands. It is identical with the ancient promontory of Leucadia, commonly called the Lover's Leap, or Sappho's Leap. The famous Greek poetess, according to an ancient tradition, threw herself from the top of this promontory.

Cape Elizabeth, a headland projecting into Casco Bay, between Portland harbor in Maine and the Atlantic Ocean, in lat. 43° 33′ N., and lon. 70° 11′ W. The coast is rocky, made up of ledges of talcose slate, traversed by dikes of trap. There are two lighthouses on the outer point, which stand 300 yards apart, the lights being 140 feet above the sea.

Cape Espichel (probably the ancient *Barbarium Promontorium*), a cape on the western coast of Portugal, 121 miles southwest of Lisbon. It rises abruptly from the sea, and is crowned by a small chapel and a lighthouse.

Cape Farewell, the southern extremity of Greenland, at the eastern entrance to Davis Strait. A strong current sets around this cape, and continues north along the eastern coast of the strait.

Cape Faro, fä'rō, the northeast extremity of the island of Sicily, known to the ancients as *Pelorus*. It is at the narrowest part of the strait of Messina, opposite the rock of Scylla on the coast of Italy.

Cape Fear, the south point of Smith's Island, near the mouth of Cape Fear River, N. C. About one mile from the shore stands Bald Head lighthouse.

Cape Fear River, a river of North Carolina; navigable for steamboats for 120 miles from its mouth. Its length, including one of the head branches, is about 300 miles. Formed by the junction of the Deep and Haw rivers, its course is generally southeast till it reaches the Atlantic Ocean. This is the largest and most important river which lies wholly within the State.

Cape Finistere, fĭn-ĭs-tār', the westernmost point of Spain, in the province of Corunna, extending southwest into the Atlantic, in lat. 42° 54′ N., and lon. 90° 21′ W. Several naval battles were fought off this cape.

Cape Flattery, the most westerly point of the State of Washington, at the entrance to the Strait of Juan de Fuca, in lat. 48° 23′ N., and lon. 124° 44′ W. On the island of Tatoosh, opposite the cape, there is a lighthouse.

Cape Florida, the southern extremity of Biscayne Key off the southeast coast of Florida, at the north entrance to Biscayne Bay, in lat. 25° 39′ N., and lon. 80° 9′ W. There is a lighthouse on the shoals opposite this point.

Cape Foulweather, a cape projecting into the Pacific Ocean from the coast of Oregon, in lat. 44° 50′ N., and lon. 124° 5′ W.

Cape Fox, or **Lalande's Dog,** a peculiar canine animal (*Otocyon lalandii*), differing from other dogs principally in the possession of an additional molar in each jaw. Other characters in the structure of the jaw and dentition suggest that *Otocyon* is a persistent creodont-like form, which has developed from a primitive arctoid stock in a direction curiously parallel to that of the true dogs. No other mammal outside the marsupial order ever has four molar teeth in both jaws, and this may indicate a still more remote marsupial ancestry. This wild dog is generally found in open country, dwelling among small bushes in pairs, exceedingly shy, and not gathering into packs. It is rather smaller than a fox and resembles a fennec in having enormous ears and a thick, bushy tail. In general color it is brownish or iron gray, mottled with yellow and with the limbs nearly black.

Cape Frio, frē'ō (Port. *Cabo Frio,* "cool cape"), a promontory on the coast of Brazil, in the State of Rio de Janeiro. It forms the terminus of a range of mountains running parallel to the coast, and consists of a huge oval mass of granite. There is a lighthouse at this point.

Cape Froward, the southern extremity of the continent of South America, lying northwest of Cape Horn, in lat. 53° 53′ S., and lon. 71° 18′ W. It is a bold promontory of dark slaty rock.

Cape Gaspé. See GASPÉ.

Cape Gata, gä'ṭa, or **Cape de Gatte,** a promontory of Spain, on the coast of Granada, 24 miles in circuit and 13 miles broad. It was formerly a resort of Moorish pirates.

Cape Girardeau, jē-rär-do', Mo., a city of Cape Girardeau County; on the Mississippi River, the Illinois Cent., and the St. Louis, C. G. & F. S. R.R.'s; 150 miles southeast of St. Louis. It is the seat of St. Vincent's College and the Southeastern Missouri State Normal School, and has a national bank and several newspapers. Pop. (1900) 4,815.

Cape of Good Hope, a promontory near the south extremity of Africa, in lat. 34° 21′ S., and lon. 18° 3′ E., at the termination of a small peninsula extending south from Table Mountain, which overlooks Cape Town. This penin-

sula forms the western side of False Bay, and on its inner coast is Simon's Bay and Simon's Town, where there is a safe anchorage and a British naval station. Bartholomew Diaz, who discovered the Cape in 1487, called it Cape of Storms; but John II. of Portugal changed this to its present designation. It was first doubled by Vasco de Gama in 1497. Here is one of the principal astronomical institutions of the world. About the middle of the 16th century the French astronomer, Lacaille, made an exceedingly valuable series of observations at the Cape. Ever since the English have had a colony there they have kept up astronomical work, the Cape having been the scene of the labors of several celebrated English astronomers, among them Sir John Herschel.

Cape Grisnez, grē-nā, a headland of France in the department of Pas-de-Calais, the nearest point of the French coast to Great Britain. It has a revolving light 195 feet high.

Cape Guardafui, gwär-dä-foo-ē', or **Gardafui,** a cape on the east coast of Africa in Somaliland, situated in lat. 11° 50′ N., and lon. 51° 16′ E.

Cape Haitien, ä-ē-tē-ăń, or **Cape Haytien,** Haiti, a town on the north coast of the island. It was formerly known as Cap Français, Le Cap, or Guarico, the latter being the native name. It has an excellent harbor, but has declined in importance in recent years. Pop. about 29,000.

Cape Hat'teras, the easternmost point of North Carolina, a sandy insular spit, or narrow beach, separated from the mainland by the broad bay called Pamlico Sound. South of the capes of the Delaware, no land stretches so far out into the Atlantic as Cape Hatteras. The Gulf Stream, in its eastern and western vibrations, often flows within 20 miles of the cape, crowding toward the shore coasting vessels bound south. The difference of temperature between the hot airs of the Gulf and the breezes along shore and from the land engender frequent commotions in the atmosphere at this place; and no point on the coast is more noted for its frequent and dangerous storms. A lighthouse is kept a little over a mile north of the outermost point.

Cape Henlo'pen, a cape on the eastern coast of Delaware at the south side of the entrance to Delaware Bay, in lat. 38° 47′ N., and lon. 75° 5′ W.

Cape Henry, a cape on the coast of Virginia at the southern entrance of Chesapeake Bay. It has a fixed light 120 feet above the level of the sea.

Cape Horn, the southern extremity of an island of the same name, forming the most southerly point of South America. It is a precipitous headland, 500 to 600 feet high, and running far into the sea. Sailing vessels often encounter dangerous tempests in passing round the Horn; steamers generally pass through the Straits of Magellan. The cape was first doubled in 1616 by the navigator Schouten, a native of Hoorn, Holland, whence its name.

Cape Hunting-dog, a wild dog of Africa (*Lycaon pictus*), which is placed in a separate genus because it differs from all other dogs in having only four toes on each limb, in lacking one pair of molars in the upper jaw, and in certain other features. It resembles a hyæna in form, and is yellowish-gray, with irregular, black markings. It hunts in packs, and is one of the enemies most dreaded by all the African antelopes. Since the decrease of this, its natural game, it has played havoc with domestic cattle and sheep, and is killed off by the settlers wherever found.

Cape Island. See CAPE MAY, N. J.

Cape de la Hague, hāg (written also, but less correctly La Hogue), a headland of Normandy, France, opposite the island of Alderney, and forming the northwestern extremity of the peninsula of Cotentin, in the English channel. It is often confounded with Fort La Hogue or La Hougue, on the opposite side of Cotentin. Near this latter promontory the united English and Dutch fleets defeated the French, 19–24 May 1692.

Cape Linguetta, lĭn-gwĕt'ta, a headland of European Turkey, 2,290 feet high. It forms the termination of the Chimara, or Acroceraunian Mountains, and bounds the east entrance into the Adriatic.

Cape Lookout, a cape situated on an island off the southeast coast of North Carolina, in lat. 34° 37′ N., and lon. 76° 31′ W. There is a lighthouse at a considerable height above the sea.

Cape Lopa'tha, the southern extremity of Kamchatka. At the northern part of the headland is a mountain, bearing the same name, whence the land gradually slopes and narrows until it terminates in a low and barren tongue.

Cape Lopez, lō'pāth, the southern extremity of the Bight of Biafra, on the west coast of Africa. It is situated in lat. 0° 36′ S., and lon. 8° 44′ E.

Cape Matapan, mä-ta-pän', a promontory of Greece, forming the southern extremity of the Peloponnesus, in lat. 36° 23′ N., and lon. 22° 29′ E. The name *Tænarum,* or *Promontorium Tænarium,* was applied by the Greeks to the headland, and to the small peninsula north of it, connected with the great Taygetic peninsula by a narrow isthmus.

Cape May, N. J., a city and watering place in the southern part of Cape May County, having good railroad and water communication. It has a fine beach and is very popular as a seaside resort, providing accommodations in hotels and boarding-houses for guests 10 times exceeding in number the permanent inhabitants. The place is sometimes called Cape City or Cape Island City. Pop. (1900) 2,257.

Cape May, the southern extremity of New Jersey, at the entrance to Delaware Bay, situated in Cape May County, in lat. 38° 56′ N., and lon. 74° 57′ W. It has a revolving light about 150 feet above sea-level.

Cape Mendocino, měn-dō-sē'no, the westernmost point of the coast of California, projecting into the Pacific Ocean in lat. 40° 26′ N., and lon. 124° 25′ W. It has a very high lighthouse with a flashing light.

Cape Ned'dock, Maine, a promontory 35 miles southwest of Portland, with a lighthouse on Goat Island near it, containing a fixed light, 33 feet above the sea.

Cape Nome, nōm, a cape on the south coast of the peninsular projection of Alaska, which separates Kotzebue Sound on the north

from Bering Sea on the south, and terminates on the west in Cape Prince of Wales. In the vicinity of the cape is a remarkably rich gold mining region. In a direct line of navigation, it lies about 2,500 miles northwest of Seattle, and 175 miles southeast of Siberia. The nearest settlement of consequence, prior to 1899, was St. Michael, 100 miles to the southeast, the starting point of the steamers for the Yukon River; but during the year various aggregations of mining population had built themselves up in closer range and reduced the isolation from the civilized world by some 60 miles. The Nome district as settled centres about the lower course of the Snake River, an exceedingly tortuous stream in its tundra course, which emerges from a badly degraded line of limestone, slaty, and schistose mountain spurs, generally not over 700 to 1,200 feet elevation, but backed by loftier granitic heights, and discharges into the sea at a position 13 miles west of Cape Nome proper.

The first discovery of gold was made in September 1898, when a party of Swedes found it on the creeks and the gulches. It was not until July 1899 that the beach gold was discovered. In the middle of October following, Nome City had 5,000 inhabitants all living in tents on the hitherto barren shore. The rapidity of the growth of this town has probably never been equaled. The region is wholly within American territory, and early prospecting indicated that it would rival in richness the famous Klondike district. During the season of 1901 $7,000,000 in gold was taken from the Cape Nome region.

Cape North, the northeast point of Cape Breton, projecting into the Gulf of St. Lawrence.

Cape North, or **Otoo, Otou,** a peninsula at the northern extremity of New Zealand, about two miles long, and terminating in a bluff head flat at the top.

Cape North, northernmost promontory of Europe. See NORTH CAPE.

Cape Nun, noon, a headland on the west coast of Morocco, extending into the sea at the southwestern extremity of the Atlas range, in lat. 28° 45′ N., and lon. 11° 5′ W.

Cape Ortegal, ôr-tā-gäl′, a rugged promontory forming the northern extremity of Spain, extending into the Bay of Biscay, in lat. 43° 45′ N., and lon. 7° 56′ W.

Cape Pal'mas, a cape on the western coast of Africa, situated in the southern part of Liberia, in lat. 4° 22′ N., and lon. 7° 44′ W.

Cape Petrel, or **Cape Pigeon,** a large petrel (*Daption capensis*), about the size of a pigeon, exceedingly numerous about the Cape of Good Hope, and widely distributed throughout the Southern Ocean.

Cape Pillar, a high mass of rocks terminating in two tower-shaped cliffs on the northwest coast of Tierra del Fuego, at the southwest entrance from the Pacific Ocean into the Straits of Magellan.

Cape Poge, a cape on the coast of Massachusetts, in lat. 41° 25′ N., and lon. 70° 26′ W. It has a lighthouse with a fixed light.

Cape Prince of Wales, a promontory on Bering Sea, the most northwest point of North America. It terminates in a peaked mountain, presenting a bold face to the sea, and is a dangerous point on account of a shoal which stretches to the northeast.

Cape Race, a promontory at the southeastern extremity of Newfoundland, in lat. 46° 39′ N., and 53° 4′ W. The fogs of this part of the coast make navigation hazardous. The British government maintains a light here.

Cape River, or **Rio de Segovia,** known also as Coco or Wanx, a river of Nicaragua, Central America, which after a generally northeast course of nearly 300 miles enters the Caribbean Sea at Cape Gracias a Dios. It is navigable for a considerable distance from the sea, but the upper part of its course is obstructed by cataracts and shallows. It forms part of the boundary between Honduras and Nicaragua.

Cape Romain′, a low and barren point of land, with a lighthouse, 37 miles northeast of Charleston, S. C.

Cape Sable, the name of two capes in North America: (1) The southernmost point of the mainland of the United States at the extremity of Florida, in lat. 25° 8′ N., and lon. 81° 9′ W. (2) A point at the southwest extremity of Nova Scotia, in lat. 43° 23′ N. and lon. 65° 37′ W.

Cape San Antonio, sän än-tō′nē-ō, the name of two capes: (1) A high, barren, and precipitous headland, on the coast of Valencia, Spain. On its summit are a convent, a watch tower, and several windmills. (2) A lofty and nearly perpendicular promontory, at the mouth of the Rio de la Plata, in the territory of Buenos Ayres.

Cape San Blas, sän blä, a low point of land, about two miles long, on the south coast of Florida, 123 miles east-southeast of Pensacola. It has a revolving light 65 feet high.

Cape San Lucas, loo′kăs, the southern extremity of the peninsula of Old California, in lat. 22° 44′ N., and lon. 109° 54′ W.

Cape St. Roque, rō′kā, **San Roque,** or **São Roque,** a cape on the east coast of Brazil, in lat. 5° 29′ S., and lon. 35° 14′ W. See BRAZIL.

Cape St. Vincent, a headland at the southwestern extremity of Portugal, in lat. 37° 3′ N., and lon. 8° 58′ W. Off this cape, 14 Feb. 1797, an English naval force, consisting of 15 ships of the line, under Admiral Jarvis, defeated a superior Spanish fleet. This point was known to the ancients as *Promontorium Sacrum.*

Cape Spartiven'to, the ancient *Herculis Promontorium,* a promontory of southern Italy, forming the southeastern extremity of Calabria, in lat. 37° 57′ N., and lon. 16° 5′ E.

Cape of Storms. See CAPE OF GOOD HOPE.

Cape Tindaro, tĭn-dä′rō, a headland of Sicily, extending into the Gulf of Patti. The remains of the ancient Tyndaris are in its neighborhood.

Cape Town, Africa, capital of the Cape Colony, situated in the midst of striking scenery, rather more than 30 miles from the Cape of Good Hope, at the head of Table Bay, which opens into the Atlantic on the northwest, and at the foot of Table Mountain. It is regularly laid out and has some good streets, with well-

built business premises and other buildings, and is furnished with most of the institutions and conveniences of a European town (including tramways). The finest edifice is that which accommodates the legislature, a handsome structure of modern erection; another good edifice is that containing the public library (40,000 volumes) and museum, in the Roman-Corinthian style. The Standard Bank of South Africa also occupies handsome premises. Other buildings are the government house, the courts and government offices, the town house, the gallery of fine arts, the railway station, the post-office, the exchange, etc. The best ecclesiastical building is the Roman Catholic Cathedral; there is also an English Episcopal Cathedral, and Dutch, Presbyterian, Lutheran, Independent, and Methodist churches. There is a well-equipped college, the South African College, which trains students for the degrees of the Cape University, which is merely an examining body. There are beautiful botanic or government gardens in the town, occupying 14 acres, and forming a fine promenade. The Cape Observatory is a celebrated institution supported by imperial funds. A railway runs from Cape Town into the interior of the colony, connecting the town with the Orange Free State and Transvaal. The port has been provided with a breakwater 3,554 feet long, inside of which ships can safely ride at anchor protected from the northwest gales; and there are two docks 16 acres in area, an outer harbor of 62 acres, a large graving dock, etc. The population is very mixed, a large number consisting of colored people of negro or other African descent. About 14,000 are Malays, descendants of those who were brought from the Dutch East Indies; they constitute the chief fishing and working population of the town and environs. They number altogether about 86,000, more than half of the whites being of Dutch descent.

Cape Trafalgar, trăf ăl gär, or trā-făl'gär, a headland on the coast of Cadiz, Spain. It is memorable for the naval battle fought near it, 21 Oct. 1805, between the English under Nelson, and the combined fleets of France and Spain. The English gained a complete victory, though with the loss of their commander. It was known to the Romans as *Promontorium Junonis.*

Cape Verde, the most westerly headland of Africa in Senegal, jutting out into the Atlantic Ocean, between the rivers Gambia and Senegal, in lat. 14° 43′ N., and lon. 17° 30′ W. It was discovered by the Portuguese navigator, Fernandez, in 1445, and is said to have derived its name from a group of gigantic baobab trees adorning its summit.

Cape Verde Islands, a group of islands west of Africa, in the Atlantic Ocean, so called from Cape Verde, opposite to which they are situated; 320 miles west of Cape Verde, and between lat. 15° and 18° N. They belong to Portugal. As to their number, some reckon 10, others 14 or more, by giving the name of islands to masses which are only rocks. They are, in general, mountainous. The island of Fogo, one of the group, consists of one single mountain, a volcano, sometimes active, about 10,000 feet above the level of the sea. Some of the islands are very bare; in others the lower hills are covered with a beautiful verdure, as well as the valleys between; but there is little water, except what is found in ponds and wells. Long droughts have occurred, sometimes causing great loss of life. The climate is hot and unhealthy in most of the islands. The soil is, for the most part, not very fertile; nevertheless, some parts produce sugar, coffee, rice, maize, etc., with bananas, lemons, oranges, citrons, grapes, and other fruits. The total population amounts to about 148,000, of whom about 4,000 are white, the rest being chiefly negroes. The chief town is Porto Praya on São Thiago (Santiago), and Porto Grande on São Vicente is a coaling station for steamers. Salt is an export of importance. Coffee, hides, and physic-nuts are also exported.

Cape Wrath, a pyramidal promontory of unrivaled wildness and grandeur, forming the northwest extremity of Scotland and running out into the Atlantic; in lat. 58° 38′ N., and lon. 4° 58′ 5″ W. It presents deep fissures and tall pinnacles. From it a reef of rocks, perforated with arches and caverns, juts out into the sea. Off the cape is Stag Rock, a pillar 200 feet high. Cape Wrath is 600 feet high, and there is a lighthouse near it, 400 feet above the sea, visible 25 miles off.

Capecelatro, Alphonse, äl-fôńs kā-pā-chĕ-lätrō, CARDINAL, Italian pietist biographer and controversialist: b. Marseilles, 5 Feb. 1824. He has won distinction as Italy's leading contemporary Church writer, with a 'History of St. Catherine of Siena and of the Papacy of Her Day' (1856); 'The Errors of Renan'; a 'Life of Jesus'; and a 'Life of St. Philip of Neri' (1882).

Capefigue, Baptiste Honoré Raymond, bäp-tēst ō-nō-rā rā-mōń käp-fēg, French historian and journalist: b. Marseilles, 1802; d. Paris, 23 Dec. 1872. His contributions to historical science are the 'History of Philip Augustus' (1829); and 'History of the Restoration and of the Causes that Led to the Fall of the Elder Branch of the House of Bourbon' (1831–3).

Cap'el, Arthur, LORD, English soldier: b. about 1610; d. 9 March 1649. He was son of Sir Henry Capel; was raised to the peerage as Lord Capel, of Hadham, by Charles I. in 1641. During the revolutionary war he fought bravely as one of the royalist generals in the west in the engagements at Bristol, Exeter, and Taunton. Having been at length forced to surrender at Colchester to Gen. Fairfax, he was imprisoned, and after some vicissitudes, executed. His 'Daily Observations or Meditations' was published posthumously with a memoir.

Capel, Arthur, VISCOUNT MALDEN and EARL OF ESSEX, English statesman, son of the preceding: b. January 1631; d. July 1683. In 1661 he was created Viscount Malden and Earl of Essex and appointed ambassador to Denmark in 1670. He served as lord-lieutenant of Ireland, 1672–7, and was for a few months in 1679 head of the treasury commission. Arrested for his connection with the Rye House Plot, was sent to the Tower, and is supposed to have committed suicide there.

Capel, Thomas John, MONSIGNOR, English Roman Catholic ecclesiastic: b: London, 28 Oct. 1835. He was educated at the Roman

Catholic College at Layston and was ordained to the priesthood in 1860. He devoted himself to education, establishing a Roman Catholic public school at Kensington in 1873, and was given the title of Monsignore by Pope Pius IX. He came to the United States in 1883, and after a lecture tour settled to private life in California. He is the author of 'The Holy Catholic Church'; 'Confession'; 'The Name Catholic'; 'The Pope the Head of the Church.' As Catesby he is supposed to be portrayed in Disraeli's 'Lothair.'

Ca'pel, or **Ca'ple,** a term used by miners to indicate the wall of a lode, especially in a tin or copper mine. It is generally of quartz, black tourmalin, and hornblende. The capels sometimes contain sufficient metallic particles to make it worth while to work them. In these cases they may be considered as forming part of the lode. The word "cab" is an equivalent used by Cornish miners. In the United States, "casing" is nearly synonymous.

Capeline, or **Capelline,** a small piece of armor, consisting of a skull cap of iron, worn in the Middle Ages by light armed men such as archers.

Cap'ell, Edward, English Shakespearean scholar: b. Throston, Suffolk, 1713; d. London, 24 Feb. 1781. He was deputy inspector of plays, and published 'Mr. William Shakespeare, His Comedies, Histories, and Tragedies'; 'Notes and Various Readings of Shakespeare'; and 'The School of Shakespeare.'

Capel'la, Martianus Mineus Felix, Latin writer of the 4th century: b. probably in Africa. His extant work, 'Satiricon,' consists of nine books, the first two under the title, 'De Nuptiis Philologiæ et Mercurii,' being an introductory allegory, while the others treat of grammar, logic, metaphysics, geometry, arithmetic, astronomy, and music. His statement of the heliocentric system of astronomy in the eighth book may possibly have given hints to Copernicus, who quotes him occasionally.

Capella, a star situated in the constellation Auriga, on the "Charioteer's" left shoulder. It is of remarkable brilliancy, only four stars exceeding it in that respect. Its color is nearly that of solar light.

Capellini, Giovanni, jō-vän'nē kä-pĕl-lē'nē, Italian geologist and paleontologist: b. Spezia, 13 Aug. 1833. He studied at Pisa, and traveled widely. In 1860 he became professor at Genoa, and later at Bologna. He has emphasized the importance of prehistoric discoveries which related archæology to paleontology and defended the Darwinian theory. He was influential in calling the International Congress of Anthropology and Prehistoric Archæology in 1865.

Capello, Bianca, bē-änk'ä kä-pĕl'lō, Italian adventuress: b. Venice, 1542; d. in the Castle Paggio di Capano, 11 Oct. 1587. In 1563 she eloped with a banker's clerk named Pietro Buonaventuri, who put himself under the protection of Francesco de Medici at Florence. The latter made Bianca his mistress and her husband his steward, but had him put to death in 1570, and after the death of his wife, Joanna of Austria, married Bianca in 1578. She and Francesco are supposed to have been poisoned by his brother and successor, Cardinal Fernando.

Capello, Hermengil'de, Augus'to de Brito, brē'tō, Portuguese African explorer: b. Lisbon, 1839. He entered the navy in 1858, and rose to the rank of captain. In 1877–9 he, with Robert Ivens, conducted an expedition which explored the sources of the Kuanga. In 1885 he set out on a second expedition with Ivens, traveling through the southern part of Africa from Mossamedes to Mozambique, thus exploring the sources of the Congo and the Zambesi, a country almost entirely unknown before. He wrote with Ivens 'De Benguella a sterras de Jacca' (1881); and 'De Angola a Contra-Costa' (1886).

Capen, Elmer Hewitt, American educator: b. Stoughton, Mass., 5 April 1838. He graduated at Tufts College in 1860, and was elected to the Massachusetts legislature while still an undergraduate, 1859. After studying at the Harvard Law School, he was admitted to the bar, and practised at Stoughton for a short time; began the study of theology, became a Universalist clergyman, held pastorates at Gloucester, Mass., and Providence, R. I., 1865–75, when he was elected president of Tufts College, a position he still holds. His administration has been most successful in every way, and under him the institution has grown to be one of the most progressive of American colleges. A limited edition of his addresses has appeared, entitled 'Occasional Addresses' (1902).

Ca'pen, Nahum, American historical writer: b. Canton, Mass., 1804; d. 4 Jan. 1886. He was postmaster of Boston, Mass. (1857–61); introduced street letter-box collections; wrote 'The Republic of the United States'; 'History of Democracy' (1874); etc. He also wrote and edited works on phrenology.

Capen, Samuel Billings, American missionary commissioner: b. Boston, Mass., 12 Dec. 1842. He was educated in the public schools, and after leaving the English High School in 1858 entered the carpet store in which he became a partner in 1864. He is best known to the public through his close association with the missionary work of the Congregational Church. He was president of the Boston Municipal League, 1894–9; of the Congregational Sunday School and Publishing Society; and served most effectively as president of the American Board of Commissioners for Foreign Missions.

Capercailzie, kăp-ĕr-kā'lĭ, **Capercaillie,** or **Cailzie,** kā'lĭ, a readily domesticated, polygamous grouse (*Tetrao urogallus*), about the size of a turkey, widely distributed throughout the pine-covered mountains of Europe. Formerly it inhabited Ireland and Scotland, where it was known as "blackcock," but it was entirely extirpated toward the end of the 18th century. It has since, however, in small numbers, been restored to Scotland by stock imported from Scandinavia. The ground color of the cock is muddy black, spotted with gray and brown; quill feathers dark brown; tail feathers nearly black; a glossy dark green chest; whitish bill and a small patch of naked skin above the eye, which is scarlet. The feet are feathered to the toes. The hen and young are dark brown, covered with freckles of a lighter shade; neck and chest yellowish chestnut, and the feathers of the under part usually edged with white. It

feeds chiefly upon berries, seeds, insects, and the young shoots of the pine and other trees, which give its flesh a delicate turpentine flavor. They are hunted with the aid of dogs, which "tree" them, when they are easily shot. In the early spring, at the approach of the breeding season, the cocks meet at an accustomed place to give the hens the benefit of their annual "dances," at which assemblies the hens seem to choose their mates by the amount of plumage, color, daring, and extraordinary gestures which each displays. On such occasions the cock is oblivious to all else save the winning of his mate, and may easily be approached and killed. The female bird builds her nest on the ground among the pines, generally laying from 6 to 12 eggs, few of which reach maturity, owing to the carelessness of the mother. They are spotted red or yellowish brown, and are over two inches long. Consult: Lloyd, 'Game Birds of Sweden and Norway'; Morris, 'British Game Birds'; and Darwin, 'Descent of Man.'

Ca'pern, Edward, English minor poet: b. Tiverton, Devonshire, 29 Jan. 1819; d. 1894. He was long in the mail service in his native county, and was often styled "The Postman Poet." The poet Landor, attracted by the verse of Capern, procured him a pension from the civil list. His published works include: 'Poems by the Biddeford Rural Postman'; 'Ballads and Songs'; 'Wayside Warbles'; 'Sun-gleams and Shadow Pearls.' His verse is mainly descriptive of Devon life and character and several of his lyrics were set to music by the poet himself.

Caper'naum, a city of ancient Palestine, on the west or northwest side of the Sea of Tiberias. This place is famous in Christian history, because Jesus often visited it during the time of his ministry, and in its vicinity he delivered the Sermon on the Mount. Nothing of the city now remains.

Ca'pers, Ellison, American Protestant Episcopal bishop: b. Charleston, S. C., 14 Oct. 1837. He graduated at the South Carolina Military Academy 1857, and was a professor there, 1858–60. He entered the Confederate army, was successively major, lieutenant-colonel, and brigadier-general, and received severe wounds at Jackson, Miss., Chickamauga, and Franklin, Tenn. He was secretary of State of South Carolina in 1867–8, then entered the Protestant Episcopal ministry, and was rector of Christ Church, Greenville, S. C., for 20 years, and at Columbia, S. C., for six years. In 1893 he was consecrated seventh bishop of South Carolina.

Capers, the unopened flower-buds of a low shrub (*Capparis spinosa*), which grows from the crevices of rocks and walls, and among rubbish, in the southern parts of France, in Italy, and the Levant. The stems of the caper-bush are trailing, and two or three feet long. In the south of France the caper-bush is very common. It grows wild upon the walls of Rome, Sienna, and Florence, and, when trained against a wall, flourishes even in the neighborhood of Paris. It was introduced into Great Britain as an exotic as early as 1596. Modern horticulturists are of opinion that with care it might be raised in the open air in England, but this has never been accomplished to any practical extent. It is cultivated on a large scale between Marseilles and Toulon and in many parts of Italy. In the early part of summer it begins to flower, and the flowers continue successively to appear until the commencement of winter. The buds are picked every morning before the petals are expanded; and as they are gathered they are put into vinegar and salt. When a sufficient quantity is collected they are distributed, according to their size, into different vessels, again put into vinegar, and then packed up for sale and exportation. The smallest capers are the dearest, simply from the reason that they are more troublesome to gather. This pickle is much used in sauce for boiled mutton. To persons unaccustomed to it the taste of capers is unpleasantly sharp and bitter, but after a little while the palate becomes reconciled to it. The flower-buds of the marsh-marigold (*Calthapalustris*) and the seeds of nasturtiums are frequently pickled and eaten as a substitute for capers. The bark of the root of the caper, cut into slices and dried in small rolls or quills, is sometimes used in medicine as a diuretic and in cases of obstruction of the liver.

Capes, Bernard, English novelist. His works include: 'The Lake of Wine' (1898); 'The Adventures of the Comte de la Muette' (1898); 'Our Lady of Darkness'; 'At a Winter's Fire' (1899); 'From Door to Door' (1900); 'Joan Brotherhood' (1900); 'Love Like a Gipsey' (1901); 'Plots' (1901). The majority of these have been republished in the United States.

Capes, William Wolfe, English historical writer. He has published: 'The Early Roman Empire'; 'Roman Empire in the 2d Century' (1876); 'University Life in Ancient Athens' (1877); 'Livy' (1879); 'Stoicism' (1880); 'History of the Achæan League,' a translation from Polybius (1888); 'The English Church in the 14th and 15th Centuries'; 'Rural Life in Hampshire.'

Capet, kā-pā, or kăp'ā, the name of the French race of kings, which has given 118 sovereigns to Europe, namely, 36 kings of France, 22 kings of Portugal, 11 of Naples and Sicily, 5 of Spain, 3 of Hungary, 3 emperors of Constantinople, 3 kings of Navarre, 17 dukes of Burgundy, 12 dukes of Brittany, 2 dukes of Lorraine, and 4 dukes of Parma. The history of this royal race is, at the same time, the history of the rise and progress of the French monarchy. The fate of one of the most interesting countries and nations in Europe is connected with the name of Capet. After having been deprived of four thrones, and again restored to them, this family stood forth as the first and most ancient support of the European principle of political legitimacy, that divine right, which in this house commenced with treason. Its origin is remarkable. Pepin the Short, the father of Charlemagne and mayor of the palace under the Merovingian dynasty, had displaced that royal house, and usurped the throne of the ancient kings of the Franks. After a space of 235 years his own descendants, the Carlovingian monarchs, experienced a similar fate. Under the last Carlovingians, destitute alike of energy and wisdom, Hugh the Great, Duke of France (by which was then understood the Isle of France), Orleans, and Burgundy, exercised a power as unlimited as that of the mayor of the palace under the Merovingians. On the death of Louis V., without children, in 987 his uncle,

Charles, Duke of Lower Lorraine, laid claim to the throne, which the Franks had sworn to preserve to the family of Charlemagne. The French nobility, disgusted at the German leanings of the Carlovingians, whose domains and influence lay in the eastern provinces, preferred that a member of their own class, whose possessions were situated in the centre of the country, and whose power was so great as to outrival that of the old dynasty, should rule over them, and accordingly chose as their king Hugh, son of Hugh the Great, Duke of France and Count of Paris, and had the support of the Church in their favor. The valiant Charles of Lorraine was surprised in Laon by the treachery of a bishop, and made prisoner. He died soon afterward in prison, and his son, Otho, Duke of Lower Lorraine, died in 1006. Both his younger brothers died childless in Germany. Thus the race of Capet was left in possession of the throne of France. According to some historians, Hugh Capet was descended from a Saxon family. He was married to a German princess, Adelaide, daughter of King Henry I. of Germany (Duke of Saxony). Hugh was crowned at Rheims, and swore to preserve to the nation, and particularly to the powerful feudal nobility and clergy, all their existing privileges. By his wise measures he gave permanence to his dynasty, which, next to the family of Guelph, is the oldest royal line at present existing. Hugh and the succeeding monarchs, till Louis VII., took the precaution to have their successors invested with the royal title during their own lifetime. Thus Hugh had his son, Robert, crowned and anointed as his colleague as early as 1 Jan. 988. He abolished by law the partition of the hereditary estates among the sons of the kings and forbade the alienation of the family domains. The daughters of the kings were endowed from that time with money, and the appanage which was given to the princes of the blood returned to the crown in default of male heirs. Both these principles were more fully confirmed by later laws. Thus Hugh Capet, by uniting his hereditary duchy, consisting of Paris, Isle de France, and Burgundy, inalienably with the crown, may be regarded as the founder of the French monarchy. What he had begun was completed by his successors, particularly in the times of the Crusades, and by the establishment of standing armies. On the failure of the direct line at the death of Charles IV., the French throne was kept in the family by the accession of the indirect line of Valois, and in 1589 by that of Bourbon. Capet being thus regarded as the family name of the kings of France, Louis XVI. was arraigned before the National Convention under the name of Louis Capet.

Cap'grave, John, English historian: b. Lynn, Norfolk, 1393; d. there, 1464. The most of his life was passed in the Augustinian friary of his native place. He was provincial of the order of Austin Friars in England, and was one of the most learned men of his day. He wrote in Latin numerous commentaries, sermons, and lives of the saints. His most important work was his 'Chronicle of England,' in English, extending from the creation to the year 1417. Other works were a 'Liber de Illustribus Henricis' and a 'Life of St. Katherine.' Many of his works are lost, others have never yet been printed. His 'Chronicle' and his 'Liber de Illustribus Henricis' have been printed in the Rolls series.

Caphtor, kăf'tŏr, the country in which the Philistines originated; mentioned in Deut. ii. 23; Jer. xlvii. 4; and Amos ix. 7. The location of Caphtor is not certain; it has been variously identified with Cappadocia, Cyprus, Crete, and Cilicia. It is most generally supposed to have been Crete, on account of the frequent connection of the Philistines with the Cherethites (or Cretans).

Capias, kāp'ē-ăs («that you take»), a writ or process whereby the sheriff is ordered to arrest the body of the defendant. The writ so framed as to call for the arrest of the defendant before judgment, in order to compel him to answer to a suit, is called a *capias ad respondendum;* if after the judgment, to compel him to satisfy the judgment, it is called a *capias ad satisfaciendum,* commonly abbreviated *ca. sa.* In case of injuries without force, the civil law, and originally the common law, did not authorize the arrest of the defendant before judgment, that is, the arrest to answer; and upon feudal principles, says Sir William Blackstone (3 Com. 281), «the person of a feudatory was not liable to be attached for injuries merely civil, lest thereby the lord should be deprived of his services.» The first writ of *capias ad respondendum* was given by act of Parliament in 1267, 52 Hen. III, c. 23, § 1, which provided that «if bailiffs, which ought to make account to their lords, do withdraw themselves, and have no lands nor tenements whereby they may be distrained, they shall be attached by their bodies, so that the sheriff shall cause them to come to make their account.» This act applied to a particular description of receivers, and supposed them not only to be debtors, but also to have in their own hands the evidence of the amount of the debt, the production of which was one object of the process. The statute of 13 Edw. I., c. 11, passed in 1285, 18 years after the former, extends this process to «all manner of receivers bound to yield account,» and provides «if they be found in arrearages upon this account, their bodies shall be arrested, and, by the testimony of the auditors, shall be sent into the next jail, and be imprisoned in irons under safe custody, and remain in prison at their own cost until they have satisfied their master (the creditor) fully of their arrearages.» It would appear that the practice of arresting on mesne process, that is before judgment, to answer in civil suits, grew out of these statutes; for the subsequent statutes of 25 Edw. III., c. 17 (1350), providing that «such process shall be made in writ of debt, detinue of chattels, and taking of beasts, by writ of *capias,* as is used in writ of account»; and of 21 Hen. VII., c. 9 (1503); evidently have reference to an arrest to answer. Formerly, a writ upon which a suit was commenced was either a *capias,* distress, or summons; either the person of the defendant was seized, and (unless he was bailed) imprisoned until the trial, or his goods or lands were seized as a guarantee of his appearance to answer; and more often, in modern times, to obtain a lien to secure satisfaction of the judgment; or he was only summoned, that is, merely had notice that a suit had been commenced before such a court, by such a plaintiff,

and was to be heard at such a time. The commencement of an action by summons is now the usual course of procedure; recent legislation, and especially the practical abolition of imprisonment for debt, having greatly restricted the use of writs of *capias* of any kind. By the Debtors' Act, 1869 (32 & 33 Vict. c. 62), the writ of *capias ad satisfaciendum* is abolished, except in cases in which the defendant can pay, but will not. The same act provides that when a plaintiff has good cause of action against a defendant to the amount of £50 or upward, and the defendant is about to quit England, and the absence of the defendant from England will materially prejudice the plaintiff in the prosecution of his action, a judge may order the defendant to be arrested unless or until security be found.

Capillaries, kăp'ĭ-lā-rĭz, or kạ-pĭl'ạ-rĭz, the extremely minute blood vessels that make the connection between the arteries and the veins. They are extremely abundant, being present in practically all parts of the body and in enormous numbers. It is by means of the capillaries that most of the interchange of nutrition takes place in the various tissues of the body. The arteries bring the fresh oxygenated blood to the parts, to which it is distributed by the rich network of capillaries, through the walls of which the waste products pass and are carried on by the blood pressure into the veins, to be eliminated by some one of the large excretory organs, the liver, etc., or carried to the lungs to be thus modified or cast off. The arrangement, width, and capacity of the capillaries varies in every tissue of the human body. In general they are arranged as a close network about the parts to which they are distributed, and in width they vary from one two thousandths to one two hundredths of an inch in diameter. See ARTERY; CIRCULATION.

Capillarity, in physics, the rise of a liquid in tubes of very fine diameter to a greater height than the surface of the fluid in which such tubes are immersed; together with certain kindred phenomena. If one end of a tube of this sort, open at both ends, be immersed in a fluid which adheres to glass, as water, the liquor within the tube will rise to a sensible height above the surface of that without. This phenomenon is explained by the attraction which exists between the glass and the fluid. Such liquids as do not adhere to glass (for example, quicksilver) do not rise in the tube; on the contrary, they stand lower within than without it. The mutual action of the elementary particles of matter, of which capillarity is a noted instance, gives rise to phenomena as interesting, and in certain cases as susceptible of being attached to theory by rigorous mathematical reasoning, as the phenomena of universal gravitation. The ascent of liquids in capillary tubes engaged much of the attention of experimental philosophers in the 18th century. Hauksbee found that the ascent of the liquid does not depend in any way on the thickness of the tube, and that when two plates, forming any small angle with each other, are plunged vertically into a fluid, the fluid which rises between them takes the form of an equilateral hyperbola; from which it followed that, in tubes of the same matter, the ascent of the liquid follows the inverse ratio of their interior diameters. In order to explain these facts succeeding physicists seem to have agreed in assuming the existence of a cohesive force among the particles of the liquid, and an adhesive force between the particles of the liquid and those of the tube. But these attractive forces can only be defined by their relative intensities at an equal distance, and the law according to which they diminish as the distance is increased. Now there are no data from which either their relative intensities or the law of their variation can be determined; we are, therefore, reduced to choose among a number of hypothetical laws, all equally possible; and the explanation, of course, depends on the particular hypothesis we adopt; hence the theories of Clairaut, Young, Laplace, and Poisson.

Clairaut was the first who attempted to reduce the phenomena of capillarity to the laws of the equilibrium of fluids, and exactly analyzed all the forces that concur to elevate the liquid in a glass tube. He showed that the portion of the liquid which is elevated in the tube above the exterior level is kept in equilibrium by the action of two forces, one of which is due to the attraction of the meniscus terminating the column, and the other to the direct attraction of the tube on the molecules of the liquid. Clairaut, however, regarded this last force as the principal one, and even supposed the attraction of the tube to extend as far as its axis; but this supposition is contrary to the nature of molecular forces, which extend only to insensible distances. The action of the tube has, in fact, no influence on the elevation or depression of the contained liquid, excepting in so far as it determines the angle under which the upper surface of the fluid intersects the sides of the tube. Neglecting, therefore, this force as insensible, there remains only the action of the meniscus to support the weight of the elevated column. But though Clairaut made an erroneous supposition respecting the nature of molecular action, and failed in the attempt to demonstrate from theory that the ascent of the liquid is inversely proportional to the diameter of the tube, he showed that a number of hypotheses regarding the law of attraction may be laid down, from any one of which that law of ascent may be deduced; and he demonstrated a very remarkable result, namely, that if the attraction of the matter of the tube on the fluid differs only by its intensity, or coefficient, from the attraction of the fluid on itself, the fluid will rise above the surrounding level when the first of these intensities exceeds half the second.

Young referred the phenomena of cohesion to the joint operation of attractive and repulsive forces, which in the interior of fluids exactly balance each other, and assumed the repulsive force to increase in a higher ratio than the attractive when the mutual distances of the molecules are diminished. From these considerations he was led to discover a very important fact in the theory of capillary action, namely, the invariability of the angle which the surface of the fluid makes with the sides of the tube.

Laplace published his theory of capillary attraction in 1806 and 1807, in two supplements to the Mécanique Céleste. Assuming the force of molecular action to extend only to imperceptible distances, he demonstrated that the form of the surface of the liquid is a principal

cause of the capillary phenomena, and not a secondary effect, and determined the part of the phenomena which is due to the cohesive attraction of the molecules of the fluid to each other, as well as that which results from their adhesion to the molecules of the tube. The separate consideration of the cohesive and adhesive forces leads to two equations, which comprehend the whole theory of capillarity — a general equation, common to all those points of the capillary surface of which the distance from the sides of the tube is greater than the radius of the sphere of molecular action; and a particular equation belonging to those points which are situated only at insensible distances from the surface of the tube, or are within the sphere of its action. This last equation will obviously express the angle which the surface of the meniscus makes with the sides of the tube; an angle which, as it depends only on the nature of the tube and that of the liquid, is constant and given in every case, the liquid and tube being supposed homogeneous. Laplace further supposes, in the case of elevation, that an infinitely thin film of the liquid first attaches itself to the sides of the tube, and thus forms an interior tube, which acts by its attraction alone to raise the column, and maintain it at a determinate height. The height of the column, consequently, depends on the cohesion and density of the liquid.

Poisson reinvestigated the whole theory of capillary attraction. Taking the most general case of the problem, he considers not merely the surface of a single liquid, but the surface formed by the contact of two liquids of different specific gravities, placed, the one above the other, in the same tube, and deduces the two equations which determine the form of the separating surface, and the angle under which it intersects the sides of the tube. These equations are in form the same as those of Laplace; but the definite integrals, which express the two constant quantities they include, are very different; and their numerical values would be so likewise, if these, instead of being determined experimentally, could be calculated *à priori* from the analytical expression. This, however, cannot be done without a knowledge of the law according to which the molecules of the liquid attract each other, as well as of that which regulates the action of the tube on the liquid. In applying his general solution to the explanation of the principal phenomena of capillarity, he took occasion to correct some inaccuracies of Laplace. The demonstration which Laplace had given of the invariability of the angle which the surface of the liquid makes with the sides of the tube was not altogether satisfactory; and he had even supposed that it changes its value when the liquid reaches the summit of the tube. Poisson demonstrated that the invariability of this angle will always be preserved, unless the curvature of the interior of the tube is infinitely great; or, in other words, unless its radius is infinitely small and of the same order of magnitude as the radius of the sphere of molecular action. Hence the angle cannot vary when the liquid reaches the summit of the tube; for, however small the radius of the tube may be, it is always incomparably greater than the radius of the sphere of molecular action.

The molecular forces which cause the elevation or depression of a fluid in fine tubes give rise also to numerous other interesting capillary phenomena. These are displayed at the surface of separation of two liquids, or of a liquid and a gas; sometimes even three fluids may be brought into simultaneous contact, and the phenomena then presented are very remarkable. In the midst of a liquid, the molecular attractions at any point being similar in all directions, and thus counterbalancing each other, may easily remain unnoticed. It is when an abrupt change produces want of symmetry in some direction that they become observable. They give rise, at the surface of separation of two fluids, to resultant forces that act just as would a stretched film containing the fluid; and the variations in these resultant forces causing a corresponding apparent variation in the contractile force of this imaginary film, occasion the phenomena we are about to describe.

The contractility of the film may be seen in the case of a little globule of mercury on a wooden table, or in the case of a soap-bubble. The mercury, instead of spreading itself out over the wood, as it might be expected to do on account of the weight of its parts, is gathered up into a little ball, just as if it were contained in an elastic bag. Again, if a soap-bubble be blown with an ordinary tobacco pipe, it may be shown, by bringing the mouthpiece near to a lighted candle, that the soap-bubble contracts with force enough to send a strong current of air backward through the stem.

The surface contractility is measured by the force required to draw out a band of it of unit breadth, or rather to prevent such a band from contracting. It has been ascertained that if we could cut out a band of the soap-and-water film an inch broad, a force of about six grains would be sufficient to hold it stretched. As there are two surfaces of the soap film, it follows that the superficial contractile force of soap and water exposed to air is about three grains per lineal inch.

M. Quinke, experimenting on this subject, found that the superficial tension for water is greater than for any other liquid that he tried. He determined the superficial tension of various liquids in contact with air, water, and mercury.

When two liquids, whose superficial tensions in air are not the same, are put in contact, both being also in contact with air, curious effects ensue. Thus when a pure water surface is touched with a glass rod that has been wetted with any kind of oil, the surface tension at the point is reduced, and the oil, with very remarkable motions, spreads itself out on the surface of the water. The well-known motions of light particles of camphor thrown on water are accounted for in the same way. This may be beautifully shown by means of an experiment devised by Prof. James Thomson of Glasgow, who first gave an explanation of the phenomenon known as the «tears of strong wine.» Let a very well cleaned glass plate be laid on a sheet of white paper, and moistened all over with slightly colored water. Then let a few very small drops of alcohol or spirits be thrown on the plate. The water film will be seen to draw away on all sides from the points where the drops fall owing to the weakening of the superficial tension at these points. The «tears of strong wine» are seen when wine, which contains water and alcohol, is allowed to evaporate in the air. The alcohol evaporates faster than

the water, and as it does so the superficial tension increases. This occurs rapidly in the thin layer of wine that adheres to the sides of a wine glass, and causes the film to be dragged from the places where the wine is strong to those where it is weak. Thus the film is seen to run up the sides of the glass, and then to collect into drops, which run down the side again.

Capilupi, Camillo, Italian poet: b. Mantua in the early part of the 16th century. He was the author of a work issued in 1572 entitled 'The Stratagem of Charles IX. against the Huguenots,' in which the Massacre of St. Bartholomew was justified, and made it appear that the action was premeditated. Cardinal Lorraine, who at the time was attending the Pope in Rome, endeavored to suppress the book from motives of policy.

Capistrano, Giovanni di, jō-vän'nĕ dē kä-pē-strä'nō, or **Capistranus, Johannes, Saint,** Italian monk: b. Capistrano, a small Neapolitan town of the Abruzzi, 24 June 1386; d. Illock, Slavonia, 23 Oct. 1456. He at first studied law, but in his 30th year, impelled by a vision, entered the Franciscan order, and was soon distinguished by the austerity of his manners, and a great zeal against the numerous heretical sects in Italy. The Popes Martin V., Eugene IV., and Felix V., often employed him as legate and inquisitor in suppressing the sect of the Fraticelli, which had spread widely over Naples and the Papal States. In 1444 he became vicar-general of the strict order of Franciscans called Observants, and in 1450 proceeded as legate to Germany with a view to suppress the Hussites, and rouse the Germans to a crusade against the Turks. His harangues in favor of a crusade against the Turks failing to make much impression on the German princes he resolved to try their effect on the populace, and easily persuaded great numbers to join him in marching against the Turks, who were advancing under Mohammed II., and had closely invested Belgrade, the key of Hungary, with an army of 150,000 men. At the instigation of Capistranus, John Corvinus Hunnyades furnished a force of 60,000, destroyed the Turkish fleet on the Danube, and threw into Belgrade succors both of men and provisions. On this expedition Capistranus in person commanded the left wing of the party, forced his way into Belgrade, repulsed a general assault by the Turks, and on 6 Aug. 1456, in conjunction with Hunnyades, signally defeated the whole Turkish host. His exertions, and the pestilential atmosphere caused by the dead bodies lying unburied around Belgrade, laid him on a sick-bed, and he died in the same year in the Franciscan monastery at Illock.

Capisuccchi, kä-pe-sook'kē, or **Capizucca, Biago,** or **Biasio,** MARQUIS OF MONTERIO, Italian general: b. Rome about the middle of the 16th century; d. 1613. He was in the service of Spain in the Low Countries, under the Duke of Parma, in 1584, afterward becoming lieutenant-general and commander of the army of Ferdinand I. de Medici, duke of Tuscany.

Capisucchi, Paolo, Italian ecclesiastic: b. Rome 1479; d. there 1539. Having become bishop of Neocastro he was summoned to Rome by Clement VII., who referred to him the question of a divorce between Henry VIII. of England and Queen Catherine. In this matter Capisucchi made a report against Henry.

Capital, in architecture the uppermost member of a column, that is to say, a separate piece of stone set upon the shaft and supporting an epistyle or the abutment of an arch — in short the mass of the building which is imposed upon the column.

A column must always have a shaft and a capital; without these features it would be a post, perhaps a pillar or a pier, but would have no architectural character. The capital, moreover, has generally received the most elaborate decorative treatment of the whole composition. Thus in Egypt, while the shaft might be cylindrical or conical, the capital would spread out immediately in curves either concave or convex, and would be carved and painted. It is even practicable to divide Egyptian columns into four orders by their capitals, which spread in different ways, and are ornamented by different sculpture, more or less imitative of nature. The idea of the spread given to the capital is, of course, that in this way the superstructure is taken more easily, as it is always and of necessity much larger horizontally than the column itself.

The stone uprights left in rock-cut temples in India and called ordinarily pillars, because of their varied forms — octagonal, square, and the like — are still divided into shaft and capital, though the forms of these are entirely remote from Egyptian or later European examples. Thus, some capitals consist of a mere enrichment of the uppermost band of the shaft and a superincumbent block very elaborately carved. In some cases this upper block gives off corbels and consoles which help to carry the roof by their greater spread.

The capitals which have excited the most interest among European students of art are those of the three Greek orders and of the five Renaissance orders which were deduced from the first three. The capital of the Grecian Doric is a reversed cone rounded off at top and carrying a square plinth or die; this plain *echinus* was richly painted in bright colors. The capital of the Ionic order is a curious device consisting of scrolls or volutes, two on each of the two opposite sides, so that this capital, almost alone, has not the same appearance from every point of view. The capital of the Corinthian order is a circular bell, surrounded by acanthus leaves and having at each corner a couple of projecting scrolls not unlike those of the Ionic order but small. This Corinthian order received many modifications in ancient Roman practice, and one of these was erected by the Renaissance men into a separate order, the so called Composite. From the Grecian Doric the Roman Doric took shape, and this was used by the Renaissance men, while a still simpler order was made from it and called the Tuscan. The capitals of these two orders are very thin and low in vertical measurement, and consist of moldings running round the continuation of the shaft, and either plain or slightly carved into the simplest of the egg and dart moldings or the like.

In mediæval architecture, both Romanesque and Gothic, the capitals are almost infinitely varied. The strong tendency of the time toward elaborate carving made this block of stone, from 5 to 20 feet above the aisles and in a prominent place, a most tempting vehicle for sculpture, and

the abandonment of the classical orders left every artist free to design his own system of leafage, animal forms and the like. In this way mediæval capitals are often of extraordinary beauty; but no attempt has been made to classify them except as they form part of a style. See COLUMN.

RUSSELL STURGIS.

Capital, in political economy, the accumulated wealth, in possession of individuals or of a community, which is available for use in further production. In estimating the capital of any individual we necessarily take into consideration the debts due to and from him; and many men of large capital are only possessed of claims upon others; their whole stock is in the hands of others at interest; and they have only promises for a certain amount of money, and actually possess neither lands nor goods to any considerable value; while others possess large quantities of both, and yet have little or no capital, since they owe in money the value of the greater part or the whole of their possessions. Now it is plain that no individual can undertake production, to any large extent, without an extensive stock. He must have land to cultivate, or materials to work up, and implements to work with. Even a savage must have a capital, such as his hut, clothes, cooking utensils, food enough to support him until he can obtain a new supply, and implements, such as a hatchet, gun, canoe, fishing gear, to procure this supply. The first effort of industry is to supply the implements, apparatus, and machinery for his own employment; and as society and the arts advance, and the operations of industry are extended, the implements, apparatus, machinery, and materials requisite in conducting the processes of production must be proportionally accumulated; and these will constitute a part of the capital of a community, and also of an individual, which is essential to success in productive processes. And these can be commanded by any one in proportion to the extent of his individual capital; or, if he have credit, then his resources for production will depend upon the capital of others — in other words, that of the community to which he belongs.

In considering the aggregate capital of a community we may put out of the question all the debts due from any of the members to others; for, whether these be great or small — and they will vary according as the practice of giving credit is more or less in use — still the capital of the community will consist in its lands, buildings, ships, machinery, materials on hand, implements; in short, in all those things which bear a value in the market. Provided the community owes no debt abroad, these will constitute its aggregate capital; and, if its members are indebted abroad, we find its actual net capital, as in the case of an individual, by deducting the amount of its debts from the value of its possessions, without regarding the debts due from some of its members to others.

Capital has long been recognized as necessary as an auxiliary to labor, despite the fact that in more recent times it has been urged by unscholarly writers and by demagogues that capital is really the tyrant of labor and that the latter could readily dispense with it. The cultivator of the soil demands a spade or a plow, the blacksmith an anvil, hammer, and bellows, etc. All trades and industries demand certain instruments,— tools, raw material, every kind of supplies, and all these are capital. This, being true on a more primitive basis, is proportionately truer in a civilized state, where labor is complicated and returns are not immediate. «In that rude state of society,» says Adam Smith, "in which there is no division of labor, in which exchanges are seldom made, and in which every man provides everything for himself, it is not necessary that any stock should be stored up in order to carry on the business of the society. . . . But when the division of labor has once been thoroughly introduced, the produce of a man's own labor can supply but a very small part of his occasional wants. The far greater part of them are supplied with the produce of other men's labor, which he purchases with the produce, or, what is the same thing, with the price of the produce of his own. But this purchase cannot be made till such time as the produce of his own labor has not only been completed but sold. A stock of goods of different kinds, therefore, must be stored up somewhere sufficient to maintain him and to supply him with the materials and tools of his work.» At any given time, capital may be arranged under the three heads above indicated — subsistence, tools, and materials.

An owner of capital, possessing an amount larger than he is capable of using in his own work, obtains the labor of others. He either attempts an industry with the assistance of workmen to whom he pays a remuneration agreed upon, or diverts a portion of his capital as a loan, or as stock, or in some other way, such capital being made effective by others. On the contrary one not possessing capital adequate to the useful employment of his activities, undertakes the combination of his labor with the capital of another. This combination may vary according to circumstances, and may of course be at times unfavorable to labor.

Capital is distinguished into floating or movable, and fixed; the former consisting of things that may be transferred by delivery of any kind from place to place, the latter of land, houses, and other property which must be taken delivery of in the place where they stand. Another use of the distinction is made to represent the difference between the permanent plant of a business and the current capital necessary to carry it on. Capital may thus be said to be fixed either when it is physically incapable of being moved, or when it is rendered immovable by the permanent arrangement of its owner. Thus one carrying on a flour-mill wants a floating or disposable capital, over and above the cost of his works, to be invested in wheat to be floured, and flour not yet disposed of. This instance illustrates what is meant by the floating or disposable capital of a whole community, being that movable exchangeable stock of things on hand, over and above the fixtures and apparatus of production, including lands, buildings, ships, working animals, all the implements of the arts, with necessary food, clothing, and a stock of seed sufficient for the time requisite for reproduction. What remains over these is the disposable capital, and, in a flourishing community, the disposable floating capital is constantly invested in new fixed capital, implements and apparatus of production. A declining community, on the contrary, consumes a part of its implements and apparatus of in-

dustry; or what is in effect the same thing, it does not repair and replace the damage of use and decay. The idea is held out in many economical treatises that a community cannot have a surplus capital; that is, it cannot have more capital than it can make use of in its consumption and reproduction. As no grounds whatever are given for this doctrine, it seems to be hardly entitled to a consideration; for the position is certainly, at the first view, very improbable, since we know very well that men may accumulate; and why they may not, in any possible case, accumulate a surplus, does not appear by any plausible reason, and whether such surplus accumulation may be useful or not will depend entirely upon the kind of articles of which such accumulation consists. If it consist in articles the value of which depends on the prices in foreign markets the excess may be of no value at all; for it may so depress the foreign prices as to countervail all the direct advantage arising from the cheaper supply, for a time, of the domestic demand.

Fictitious capital generally means nothing more nor less than excessive credits, which throw the management and disposition of a great deal of property into the hands of persons who are not able to answer for the risks of loss from its bad management, or other causes. A whole community, in the aggregate, can have fictitious capital only in case of its members having an excessive credit in a foreign country. But the members may, among themselves, have a fictitious capital by too great credits in their dealings with each other, and the fiction, in this case, is in their false promises of payment. See POLITICAL ECONOMY; TRUSTS; WAGES.

Capital (*Das Kapital*), a noted work by Karl Marx, published in 1867. English translation edited by Fred Engels, 1887. A book of the first importance, by the founder of international socialism. The conservative aspect of Marx's teaching is in the fact that he honestly seeks to understand what, apart from any man's opinion or theory, the historical development actually is; and that he does not think out and urge his own ideal programme of social reform, but strives to understand and to make understood what must inevitably take place.

Capital Punishment (Latin, *caput*, "the head"; hence *capitalis*, "pertaining to or affecting the head"; hence "affecting the life"), the punishment of death. The questions most commonly discussed by philosophers and jurists under this head are: (1) as to the right of governments to inflict the punishment of death; (2) as to the expediency of such punishment; (3) as to the crimes to which, if any, it may be most properly confined and limited; (4) as to the manner in which it should be inflicted.

1. As to the right of inflicting the punishment of death. This has been doubted by some distinguished persons; and the doubt is often the accompaniment of a highly cultivated mind, inclined to the indulgence of a romantic sensibility, and believing in human perfectibility. The right of society to punish offenses against its safety and good order will scarcely be doubted by any considerate person. In a state of nature individuals have a right to guard themselves from injury, and to repel all aggressions by a force or precaution adequate to the object. This results from the right of self-preservation. If a person attempts to take away my life, I have, doubtless, a right to protect myself against the attempt by all reasonable means. If I cannot secure myself but by taking the life of the assailant, I have a right to take it. It would otherwise follow that I must submit to a wrong, and lose my life rather than preserve it by the means adequate to maintain it. It cannot, then, be denied, that in a state of nature men may repel force by force, and may even justly take away life, if necessary, to preserve their own. When men enter society, the right to protect themselves from injury and to redress wrongs is transferred generally from the individuals to the community. We say that it is generally so, because it must be obvious that in many cases the natural right of self-defense must remain. If a robber attacks one on the highway, or attempts to murder him, it is clear that he has a right to repel the assault, and to take the life of the assailant if necessary for his safety; since society in such a case could not afford him any adequate and prompt redress. The necessity of instant relief, and of instant application of force, justifies the act, and is recognized in all civilized communities. When the right of society is once admitted to punish for offenses, it seems difficult to assign any limits to the exercise of that right, short of what the exigencies of society require. If a state have a right to protect itself and its citizens in the enjoyment of its privileges and its peace, it must have a right to apply means adequate to this object. The object of human punishments is, or may be, threefold: (1) to reform the offender; (2) to deter others from offending; and (3) to secure the safety of the community, by depriving the offender of the power of doing mischief. The first consideration rarely enters into human legislation, because of the inadequacy of our means to produce great moral results by the infliction of punishment. The two latter considerations enter largely into the theory and practice of legislation. Who is to be the judge in such cases? what is the adequate punishment for any offense? Certainly punishments ought not to be inflicted which are utterly disproportionate to the offense, and beyond the exigencies of society. No government has a right to punish cruelly and wantonly and from mere revenge; but still, the discretion must be vested somewhere, to say what shall be the degree of punishment to be assigned to a particular offense. That discretion must be, from its nature, justly a part of the legislative power, and to be exercised according to the actual state of society. It may,—nay, it must,—be differently exercised in different ages and in different countries; for the same punishment which in one age or country may be sufficient to suppress an offense, or render it comparatively harmless, may, in another age or country, wholly fail of the effect. If mild punishments fail of effect, more severe ones must be resorted to if the offense be of a nature which affects society in its vital principles, or safety, or interests. The very frequency of a crime must often furnish a very strong ground for severe punishment, not only as it furnishes proof that the present punishment is insufficient to deter men from committing it, but from the increased necessity of protecting society against dangerous crimes. But it is often said that life is the gift of God,

and therefore it cannot justly be taken away, either by the party himself or another. If he cannot take it away, he cannot confer that power on others. But the fallacy of this argument is obvious. Life is no more the gift of God than other personal endowments or rights. A man has, by the gift of God, a right to personal liberty and locomotion, as well as to life; to eat and drink and breathe at large, as well as to exist, yet no one doubts that, by way of punishment, he may be confined in a solitary cell; that he may be perpetually imprisoned or deprived of free air, or compelled to live on bread and water. In short, no one doubts that he may be restrained in the exercise of any privileges or natural rights short of taking his life. Yet the reasoning, if worth anything, extends to all these cases in an equal degree. If, by his crimes, a man may justly forfeit his personal rights, why not his life? But we have seen that it is not true, even in a state of nature, that a man's life may not be taken away by another if the necessity of the case requires it. Why, then, may not society do the same if its own safety requires it? Is the safety of one person more important than the safety of the whole community? Then, again, as to a man's inability to confer on others a right which he does not himself possess. Suppose it is so; the consequence which is deduced from this does not, in fact, arise. Blackstone, indeed, seems to deduce the right of society to punish capital offenses in certain cases (that is, in cases of *mala prohibita* and not *mala in se*) from the consent of the offenders. The Marquis Beccaria, on the other hand, denies than any such consent can confer the right, and therefore objects to its existence. But the notion of consent is, in nearly all cases, a mere theory, having no foundation in fact. If a foreigner comes into a country and commits a crime at his first entrance, it is a very forced construction to say that he consents to be bound by its laws. If a pirate commits piracy, it is absurd to say that he consents to the right of all nations to punish him for it. The true and rational ground on which the right rests is not the consent of the offender, but the right of every society to protect its own peace, interests, property, and institutions, and the utter want of any right in other persons to disturb, or destroy, or subtract them. The right flows, not from consent, but from the legitimate institution of society. If men have a right to form a society for mutual benefit and security, they have a right to punish other persons who would overthrow it. There are many cases where a state authorizes life to be taken away, the lawfulness of which is not doubted. No reasonable man doubts the right of a nation, in a just war, especially of self-defense, to repel force by force and to take away the lives of its enemies. And the right is not confined to repelling present force, but it extends to precautionary measures which are necessary for the ultimate safety of the nation. In such a war a nation may justly insist upon the sacrifice of the lives of its own citizens, however innocent, for the purpose of ensuring its own safety. Accordingly we find that all nations enrol militia and employ troops for war, and require them to hazard their lives for the preservation of the state. In these cases life is freely sacrificed by the nation; and the laws enacted for such purposes are deemed just exercises of power. If so, why may not life be taken away by way of punishment if the safety of society requires it? If a nation may authorize, in war, the destruction of thousands, why may it not authorize the destruction of a single life, if self-preservation require it? The mistake, however, is in supposing that life cannot be taken away without the consent of the party. If the foregoing reasoning be correct, such consent is neither supposed nor necessary. In truth, the supposition of an original compact between all the persons who are subject to the regulations of a society, by their own free consent, as the necessary and proper basis on which all the rights of such society depend, is at best a gratuitous supposition, and it sometimes leads to very incorrect results. It may be added that the Scriptures most clearly recognize and justify the infliction of capital punishments in certain cases.

2. As to the expediency of capital punishment. This opens a wide field for discussion. Some able men who do not doubt the right do still deny the expediency of inflicting it. It may be admitted that a wise legislature ought to be slow in affixing such a punishment to any but very enormous and dangerous crimes. The frequency of a crime is not of itself a sufficient reason for resorting to such a punishment. It should be a crime of great atrocity and danger to society, and one which cannot otherwise be effectually guarded against. In affixing punishments to any offense, we should consider what are the objects and ends of punishment. It is clear that capital punishment can have no effect in reforming the offender himself. It may have, and ordinarily does have, the effect of deterring others from committing a like offense; but still, human experience shows that even this punishment, when inflicted for small offenses, which are easily perpetrated, and to which there is great temptation, does not always operate as an effectual terror. Men are sometimes hardened by the frequent spectacles of capital punishments and grow indifferent to them. Familiarity deprives them of their horror. The bloodiest codes are not those which have most effectually suppressed offenses. Besides, public opinion has great weight in producing the acquittal or condemnation of offenders. If a punishment be grossly disproportionate to the offense, if it shock human feelings, there arises, insensibly, a sympathy for the victim and a desire to screen him from punishment; so that, as far as certainty of punishment operates to deter from crimes, the object of the legislature is often thus defeated. It may be added that a reasonable doubt may fairly be entertained whether any society can lawfully exercise the power of punishing beyond what the just exigencies of that society require. On the other hand, a total abolition of capital punishments would, in some cases at least, expose society to the risk of deep and vital injuries. A man who has committed murder deliberately has proved himself unfit for society and regardless of all the duties which belong to it. The safety of society is most effectually guarded by cutting him off from the power of doing further mischief. If his life be not taken away, the only other means left are confinement for life or transportation and exile for life. Neither of these is a perfect security against the commission of other crimes, and may not always be

within the power of a nation without great inconvenience and great expense to itself. It is true that the latter punishments leave open the chance of reform to the offender, which is indeed but too often a mere delusion; but, on the other hand, they greatly diminish the influence of another salutary principle, the deterring of others from committing like crimes. It seems to us therefore that it is difficult to maintain the proposition that capital punishments are at all times and under all considerations inexpedient. It may rather be affirmed that in some cases they are absolutely indispensable to the safety and good order of society. Some states have, however, entirely abolished capital punishment, as is the case in Holland, Rumania, Portugal, a certain number of the Swiss cantons, and some States of the American Union. It was entirely abolished in Switzerland in 1874, but a few years after, owing to the increase of murders, it was again made permissible. It was also for a time done away with in Austria and in one or two of the States of this country.

3. As to the crimes to which capital punishments may most properly be limited. From what has been already said it is plain that this must depend upon the particular circumstances of every age and nation; and much must be left to the exercise of a sound discretion on the part of the legislature. As a general rule humanity forbids such punishments to be applied to any but crimes of very great enormity and danger to individuals or the state. If any crimes can be effectually suppressed by moderate means, these ought certainly to be first resorted to. The experience, however, of most nations, if we may judge from the nature and extent of their criminal legislation, seems to disprove the opinion so often indulged by philanthropists that capital punishments are wholly unnecessary. The codes of most civilized nations used to abound with capital punishments. That of Great Britain long continued to be very sanguinary. Blackstone, in his 'Commentaries,' admits that in his time not less than 160 crimes were by the English law punishable with death. Forgery was one of these up to the reign of William IV. The only crimes for which capital punishment may now be inflicted, according to the law of England, are high treason and murder. The law in Scotland is substantially the same, a sentence of capital punishment now being competent only in cases of treason, murder, and attempts to murder in certain cases. By United States statutes nine crimes are so punishable, including treason, murder, arson, rape, piracy, and robbery of the mail. In several States of the Union still fewer crimes are generally punishable with death. Beyond treason, murder, arson, piracy, highway robbery, burglary, rape, and some other offenses of great enormity and of a kindred character, it is extremely questionable whether there can be necessity or expediency in applying so great a severity. Beccaria, with his characteristic humanity and sagacity, has strongly urged that the certainty of punishment is more important to deter from crimes than the severity of it.

4. As to the manner of inflicting the punishment of death. This has been different in different countries, and in different stages of civilization in the same countries. Barbarous nations are generally inclined to severe and vindictive punishments; and, where they punish with death, to aggravate it by prolonging the sufferings of the victim with ingenious devices in cruelty. And even in civilized countries, in cases of a political nature or of very great atrocity, the punishment has been sometimes inflicted with many horrible accompaniments. Tearing the criminal to pieces, piercing his breast with a pointed pole; pinching to death with red-hot pincers; starving to death; breaking his limbs upon the wheel; pressing to death in a slow and lingering manner; burning at the stake; crucifixion; sawing to pieces; quartering alive; exposure to wild beasts; and other savage punishments, have been sometimes resorted to for the purposes of vengeance, public example, or public terror. Compared with these the infliction of death by drowning, strangling, poisoning, bleeding, beheading, shooting, or hanging is a moderate punishment. In modern times public opinion is strongly disposed to discountenance the punishment of death by any but simple means; and the infliction of torture is almost universally reprobated. Even in governments where it is still countenanced by the laws it is rarely resorted to; and the sentence is remitted, by the policy of the government, beyond the simple infliction of death. In Prussia, where atrocious criminals were required by the penal code to be broken upon the wheel, the king latterly used always to issue an order to the executioner to strangle the criminal (which was done by a small cord not easily seen) before his limbs were broken. So in the same country, where robbery attended with destruction of life was punished by burning alive, the fagots were so arranged as to form a kind of cell in which the criminal was suffocated by the fumes of sulphur, or other means, before the flame could reach him. Not only is torture now abolished by civilized nations, but even the infliction of capital punishment in public has been given up by most of them. In England, in high treason, the criminal is sentenced to be drawn to the gallows, to be hanged by the neck until he be dead, to have his head cut off, and his body divided into four parts, and these to be at the disposal of the Crown. But, generally, all the punishment is remitted by the Crown, except the hanging and beheading, and these too may be altogether remitted according to circumstances. In other cases the punishment is now simply by hanging, or, in the military and naval service, by shooting. In France formerly the punishment of death was often inflicted by breaking the criminal on the wheel. The usual punishment now is beheading by the guillotine. In 1853 a kind of guillotine (*Fallschwert*) was introduced into the kingdom of Saxony, and it has since been adopted as the means of execution in several other German states. In Austria the general mode of punishment is by hanging. In Prussia hanging is rarely inflicted; but the usual punishment is beheading with a heavy axe, the criminal's head being first tied to a block. In one or two German states execution by the sword still exists. It should be remarked, however, that in Germany hanging has always been deemed the most infamous sort of punishment; and the sentence has often been commuted for beheading by the sword as a milder or less dishonorable mode of punishment. In the United States of America hanging is the almost universal mode of capital punish-

ment, though electricity has recently been tried. The Constitution of the United States contains a provision against "cruel and unusual punishments." In China decapitation by the sword is the usual form: murderers are cut to pieces; robbers not. In Russia the punishment of death has been frequently inflicted by the knout. In Turkey strangling and sewing the criminal up in a bag, and throwing him into the sea, are common modes of punishment. In the Roman code many severe and cruel punishments were prescribed. During the favored times of the republic many of these were abolished or mitigated. But again, under the emperors, they were revived with full severity. In the ancient Grecian states the modes of punishment were also severe and often cruel. The ancient Greek mode of capital punishment by taking poison at such hour as the condemned party should choose, seems never to have been in use among any Christian people.

Whether execution ought to be public or private has been a question much discussed, and one upon which a great diversity of opinion exists among intelligent statesmen. On the one hand, it is said that public spectacles of this sort have a tendency to brutalize and harden the people, or to make them indifferent to the punishment; and the courage and firmness with which the criminal often meets death have a tendency to awaken feelings of sympathy, and even of admiration, and to take away much of the horror of the offense as well as of the punishment. On the other hand it is said that the great influence of punishment in deterring others from the like offense cannot be obtained in any other way. It is the only means to bring home to the mass of the people a salutary dread and warning; and it is a public admonition of the certainty of punishment following upon crime. It is also added that all punishments ought to be subjected to the public scrutiny, so that it may be known that all the law requires, and no more, has been done. Since 1868 the law of the United Kingdom has required all executions to take place privately within the prison walls, and this system seems to have given general satisfaction. The same method is also practised in various other countries. In 1870 a similar measure was proposed in the French Assembly, but the war prevented it being passed and it is not yet law.

In England, the court before which the trial is held declares the sentence and directs the execution of it. In the courts of the United States there is a like authority; but in the laws of many of the States there is a provision that the execution shall not take place except by a warrant from the governor, or other executive authority. In cases of murder and other atrocious crimes the punishment in England is usually inflicted at a very short interval after the sentence. In America there is usually allowed a very considerable interval, varying from one month to six months. In Great Britain there lies no appeal from the verdict of a jury and the sentence of a court, in capital cases, and the very fact that the verdict and sentence are final produces great caution and deliberation in the administration of criminal justice, and a strong leaning toward the prisoner on trial. In the United States there is considerable latitude of appeal. In France there may be a review of it in the court of cassation. In Germany there is, in criminal as in civil cases, a right of appeal; hence, in that country, few innocent persons have suffered capitally since the 16th century. Capital punishment cannot be inflicted, by the general humanity of the laws of modern nations, upon persons who are insane or who are pregnant, until the latter are delivered and the former become sane. It is said that Frederick the Great required all judgments of his courts condemning persons to death, to be written on blue paper; thus he was constantly reminded of them as they lay on his table among other papers, from which they were readily distinguished. He usually took a long time to consider such cases, and thus set an excellent example to sovereigns of their duty.

Capitals (*majuscula*), the large letters used in writing and printing, most commonly as the initial letters of certain words, or of all words in certain positions, and distinguished from the small letters (*minuscula*). As among the ancient Greeks and Romans, so also in the early part of the Middle Ages, all books were written without any distinction in the kind of letters used; but gradually the practice became common of beginning a book, subsequently, also, the chief divisions and sections of a book, with a large capital letter, usually illuminated and otherwise richly ornamented. In legal or state documents of the 13th century capital letters are found dispersed over the text as the initial letters of proper names, and of the names of the Deity, and in the next century the same usage was followed in ordinary manuscripts. The practice with regard to the use of capitals varies in different countries. Sentences and proper names begin almost universally with capitals, but there are several other cases in which the usage is not so general. In English there cannot be said to be any invariable rule regulating their use. The first personal pronoun is always written and printed with a capital letter, and it is common also to begin titles and the names of well-known public bodies, societies, institutions, etc., with capitals. Formerly, it was a frequent practice to begin all substantives in English with a capital, which is still the rule in German. The Germans also begin all titles and pronouns of address with capitals, but not the first personal pronoun. One point in which the English practice differs from that of Germany, France, Italy, and other continental countries, is in beginning adjectives derived from proper names, such as Spanish, Italian, etc., like proper names themselves, with capitals, such adjectives being printed in other countries entirely with small letters.

Capitanis, kăp-ĭ-tā'nēs. See ARMATOLES.

Capitation is applied to anything that concerns a number of persons individually. Thus a capitation-tax is a tax imposed upon all the members of a state, each of whom has to pay his share, and is distinguished from taxes upon merchandise, etc. A capitation-grant is a grant given to a number of persons, a certain amount being allowed for every individual among the number.

Capito, or Kopfel, Wolfgang Fabricius, vōlf'gāng fā-brēt'sē-oos cä'pē tō, or kėp'fėl, Alsatian reformer: b. Haguenau, 1478; d. Strassburg, November 1541. Entering the Benedictine order, he became professor of theology at Basel, where he showed in his lectures

a tendency to shake off the trammels of the scholastic writers. He approved of Luther's action, but nevertheless in 1519 entered the service of Albert of Mainz; and it was not till some years later that he finally declared for the Reformation. He then entered zealously into its work, shared with Bucer the composition of the Confessio Tetrapolitana, and took part in the Synod of Bern in 1532.

Cap'itol, now *Campidoglio,* the citadel of ancient Rome, standing on the Capitoline Hill, the smallest of the seven hills of Rome, anciently called the Saturnine and the Tarpeian Rock. It was planned and said to have been begun by Tarquinius Priscus, but not completed till after the expulsion of the kings. At the time of the civil commotions under Sulla it was burned down, and rebult by the senate. It again suffered the same fate twice, and was restored by Vespasian and Domitian. The latter caused it to be built with great splendor, and instituted there the Capitoline games. Dionysius says the temple, with the exterior pillars, was 200 feet long and 185 broad. The whole building consisted of three temples, which were dedicated to Jupiter, Juno, and Minerva, and separated from one another by walls. In the wide portico triumphal banquets were given to the people. The statue of Jupiter, in the capitol, represented him sitting on a throne of ivory and gold, and consisted in the earliest times of clay painted red. Under Trajan, it was formed of gold. The roof of the temple was made of bronze; it was gilded by Quintus Catulus. The doors were of the same metal. Splendor and expense were lavished upon the whole edifice. On the pediment stood a chariot, drawn by four horses, at first of clay, and afterward of gilded brass. The temple itself contained an immense quantity of the most magnificent presents. The most important papers were preserved in it. The Capitoline Hill consists of three parts, namely, the northern summit, now occupied by the church of Santa Maria in Aracœli; the southern summit, crowned by the Palazzo Caffarelli, now occupied by the German ambassador; and the depression between these, in which is now the Piazza del Campidoglio. The above church, which is approached from the northwest by a lofty flight of steps, is of great antiquity. In 1888 the Franciscan monastery which was connected with it was replaced by a large monument of Victor Emmanuel II. The Piazza del Campidoglio was designed by Michael Angelo. In its centre is a fine equestrian bronze statue of Marcus Aurelius. On the southeast side there is the Palazzo del Senatore, with a fine flight of steps erected by Michael Angelo. The Palace of the Conservatori occupies the southwest side of the square, and contains valuable collections in art and antiquities. Directly opposite is the Capitoline Museum, founded by Innocent X. The southern summit of the hill is now called Monte Caprino, and on it, beside the Palazzo Caffarelli already mentioned, stands a hospital and a German archæological institute. (See ROME.) Besides the edifice in Washington where Congress assembles, some of the statehouses in States of the Union are officially called capitols.

Capitol at Washington, History of the. After the national capital had been located on the Potomac in 1789, Washington and Major P. C. L'Enfant selected sites for the public buildings. On the first map (1791), the "Congress House" is situated as now, on a low hill commanding the best view in Washington, with 12 broad streets radiating from it, so that it closes the vista of every main avenue. On the decision of a board of three commissioners, with Washington and Jefferson, the plans of the capitol and the President's house were given out in 1792 to public competition, for a prize of $500 or a medal of that value, at the winner's option. For the President's house James Hoban's plans were accepted at once, and he was made superintendent of its erection. For the capitol none were satisfactory, but the three foremost competitors were given another trial, and one, Stephen Hallet, a French artist living in Philadelphia, was employed at a salary and indemnity to revise his plans under the commissioners' criticism. But later in the year Dr. William Thornton (q.v.) of Tortola Island, W. I., submitted plans whose "grandeur, simplicity, beauty, and convenience" forced the committee to accept them. They were too grand for the commissioners' ideas of national needs or resources at the time, however, and specified too costly materials. Thornton wished marble and mahogany and the best of construction, and under a bitter assault from several of his rejected competitors, headed by Hallet, whom the commissioners had joined with Thornton in a revising board, he was forced to reduce its scale and material greatly. Their suggested modifications of his general plan were, however, disapproved. These plans were for what is now the central portion of the capitol.

Work was begun about 1 August. The corner-stone was laid 18 September in the southeast corner of the old north wing, now the supreme court section, with imposing ceremonies, Masonic rites and procession, and a barbecue. Hoban was made superintendent, and Hallet his assistant; but Hoban gave his whole time to the White House, as the President's house came to be called, and Hallet was the real manager. He proceeded to change Thornton's plans and specifications at will, was repeatedly censured for it, and at last ordered to stop it. He resigned, but refused to give up the drawings; the commissioners at last secured them and discharged him, 15 Nov. 1794. Thornton, now one of the commissioners of the District of Columbia, was asked by Washington to obliterate Hallet's changes as injurious, and did so. Hoban now acted as superintendent until George Hadfield, an English architect, was engaged to succeed Hallet, on Jonathan Trumbull's recommendation of him as a modest man and good artist. He outdid Hallet; spent his whole energy in fighting Thornton and Hoban (who always worked in harmony), and after repeated resignations and reconsiderations, was discharged for practical incompetence 10 May 1798. Hoban again took charge. On 17 Nov. 1800 the second session of the sixth Congress met in the north wing of the building. Much of this early construction was of wood or poor material. This was on account of haste, the local interests being very urgent for the coming of the government to that seat. A few years later more durable material was substituted. The commissionership was abolished May 1802, and Thornton and Hoban ceased direct superintendence, though often called in

THE NATIONAL CAPITOL, WASHINGTON, D. C.

Main

consultation. At this time the north wing was complete, the foundation of the central rotunda and dome in place, and the basement story of the south wing partly done. These are still as Thornton planned them.

On 6 March 1803 Jefferson appointed Benjamin H. Latrobe (q.v.) "surveyor of public buildings." He at once began, like the others, to besiege the President with the bitterest assaults on Thornton's designs, and when the former declined to interfere, appealed to Congress. Thornton, however, now in charge of the patent office, though he defended himself with severity, made no further attempt to prevent the alteration of his plans; and Latrobe made many serious changes, some of them since judged harmful to beauty and utility. Thus, the Representatives' hall was changed from a graceful, ellipse to a square with semicircular ends; a bad echo gave trouble for many years, caused by the changes. The number and size of entrances to the rotunda were curtailed, the splendid open staircases, cut down and placed in obscurity, were difficult for strangers to find; and the grand semicircular western portico was abolished. The principal entrance was also changed from the west front, facing the White House, to the eastern side. Latrobe was constantly in hot water with both Jefferson and Congress, and published a pamphlet against them in 1806; but till 1811 had pretty much his own way. When the War of 1812 broke out, the capitol consisted of the north and south wings, connected by a corridor of rough boards over the central foundations. On 24 Aug. 1814 the British burnt it as far as possible, piling the furniture and platforms in the rooms with rocket stuff and igniting them; the interior was dreadfully damaged, but the outside walls remained, also the inside brickwork and some stone. A strong movement arose for removing the capital elsewhere; but the same considerations prevailed against it as later. In fear of such a result, however, the local interests formed the "Capitol Hotel Company," and erected a building for government occupancy till the repairs on the capitol were finished. It was occupied, 1815–19, and was afterward known as the "Old Capitol," and used in the Civil War as a military prison. In the reconstruction the House wing was entirely altered.

Near the end of 1817 Latrobe became embroiled with a new commissioner of the Federal building, Samuel Lane, and resigned. In his place was appointed Charles Bulfinch (q.v.), from 1 Jan. 1818; he remained supervising architect for the next decade. In the winter of 1819–20 Congress took its seat in the new hall. The centre was pushed forward to completion, and on 10 Dec. 1824, the entire interior was finished. In 1825 a public competition was held for the figures on the pediment of the eastern portico. From 1826 on Bulfinch was employed on special detail, and the landscape gardening and work on the grounds, which were of his designing. The capitol was set in a park of 22½ acres, encircled by an iron railing somewhat taller than a man, affixed in the sandstone coping of a low wall. There were four carriage and five pedestrian entrances. On 2 March 1828 the position of architect of the capitol was abolished; but Bulfinch remained in employment till the end of June 1829, when Jackson dismissed him. He designed and planned the modern form of the then west extremity of the building, the Senate galleries, and the terraces on the east; and made the dome higher than in Thornton's plan. Among others who should have great credit for the beauty of the capitol are Peter Lenox, clerk of works under Latrobe; George Blagden, superintendent of stonecutters; and Giovanni Andrei, an Italian, superintendent of carvers. That so beautiful and harmonious a structure should have emerged from the contentions of so many different minds is due partly to the really great ability of the three chief architects, Thornton, Latrobe, and Bulfinch, and partly to the determination of successive Presidents that the changes should harmonize with the original design. Latrobe's material external alterations of Thornton's plan have been mentioned; Bulfinch designed the western central portico as it now stands.

From 1829 to 1836 there was no architect of the capitol. On 6 June 1836, Jackson appointed as Federal architect Robert Mills (q.v.), who had studied under Latrobe; and he held the place till 1851. Thomas U. Walter (q.v.) then took the post, having drawn the plans for the two modern wings that extended the original capitol, which the government needs had outgrown, into the modern one. The corner-stone of the extension was laid by President Fillmore, 4 July 1851; the new Representatives' hall was occupied in 1857; the Senate hall in 1859. The great lengthening of the dimensions required a correspondent heightening of the dome; and Mr. Walter designed a new one, which was constructed during the Civil War, and completed at the close of 1863, the statue of Freedom being then lifted into place. Mr. Walter, however, had foreseen a future need of still further extension, and had drawn plans for it while the other work was going on. These have been awaiting their time since; and Congress in the spring of 1903 authorized their execution, at a probable expenditure of $2,500,000 and three years' time, under the supervision of the present Federal architect, Mr. Woods. This extension is to the eastward, and involves the removal of Latrobe's portico at the east front, but none of the old walls. The present front wall will become the rear wall of an open court, which is to light the west side of the addition. This will contain 66 new and handsome rooms, divided equally between the Senate and the House. (For a minute history of the capitol down to 1851, see Glenn Brown in the 'American Architect,' Vols. LXII.–LXV.).

Capitoline Games, games held in ancient Rome in celebration of the deliverance of the city from the Gauls, and in honor of Jupiter Capitolinus, to whom they ascribe the salvation of the capitol in the hour of danger. They were instituted 387 B.C., after the departure of the Gauls.

Capitoli'nus, Julius, Roman historian, who lived toward the end of the 3d century, and wrote the lives of nine emperors. He is one of the writers of the 'Historia Augusta,' in the editions of which his works are to be found.

Capitulary, ka-pĭt'ū-la-rĭ (Lat. *capitula,* "chapters"), a writing divided into heads or chapters, especially a law or regal enactment so divided into heads. Laws known by this designation were promulgated by Childebert, Clothaire, Carloman, and Pepin, kings of France;

but no sovereign seems to have put forth so many of them as the Emperor Charlemagne, who appears to have wished to effect, in a certain degree, a uniformity of law throughout his extensive dominions. With this view it is supposed he added to the existing codes of feudal laws many other laws, divided or arranged under small chapters or heads, sometimes to explain, sometimes to amend, and sometimes to reconcile or remove the differences between them. These were generally promulgated in public assemblies composed of the sovereign and the chief men of the nation, both ecclesiastical and secular. They regulated equally the spiritual and temporal administration of the kingdom; and the execution of them was entrusted to the bishops, the courts, and the *missi regii*, officers so called because they were sent by the French kings of the first and second race to dispense law and justice in the provinces. Many copies of these capitularies were made, one of which was generally preserved in the royal archives. The authority of the capitularies was very extensive. It prevailed in every kingdom under the dominion of the Franks, and was submitted to in many parts of Italy and Germany. The earliest collection of the capitularies is that of Anségise, abbot of Fontenelles. It was adopted by Louis the Debonnaire and Charles the Bald, and was publicly approved of in many councils of France and Germany. But as Anségise had omitted many capitularies in his collection, Benedict, the Levite or deacon of the church of Mentz, added three books to them. Each of the collections was considered to be authentic, and of course was appealed to as law. Subsequent additions have been made to them. The best editions of them are those of Baluze (two volumes, Paris 1677), and of Pertz in the 'Monumenta Germaniæ Historica' (2d div. Vols. I. and II.; Hanover 1835–7). The capitularies remained in force in Italy longer than in Germany, and in France longer than in Italy. The incursions of the Normans, the intestine confusion and weakness of the government under the successors of Charlemagne, and above all the publication of the epitome of canon law termed the Decretum of Gratian, about the year 1150, which totally superseded them in all religious concerns, put an end to their authority in France.

Capitula'tion ("a writing drawn up in heads"), in military language, the act of surrendering to an enemy upon stipulated terms, in opposition to a surrender at discretion.

In the 15th century capitulations, as they were called, were presented by the ecclesiastical establishments in Germany to their newly chosen abbots and bishops, who were obliged to swear to observe them as laws and conditions for their future rule. The ecclesiastical Electors obtained, after the fall of the Hohenstaufen family, certain advantageous promises from the new emperors, which were called capitulations. When Charles V. was proposed as emperor, and it was apprehended, on account of his foreign education, that he would disregard the German constitution, he was obliged to make oath that he would not reside without the German empire, nor appoint foreigners to office in the empire, etc. This was called his "election capitulation." Such a *Wahlcapitulation* was afterward presented to every new emperor as a fundamental law of the empire. In this way the authority of the German emperors was constantly more and more diminished, so that at last it became merely nominal, since the electors, at the choice of every new emperor, made some new infringement on the imperial privileges. The *Wahlcapitulationen* were acknowledged bargains, certainly unique in history.

Capiz, kä pēth', Philippines, capital of the province of Capiz, situated in the northern part of the island of Panay, four miles from the mouth of the Panay or Capiz River. The river is navigable to the city, and there is also an excellent roadstead at its mouth. There is a large local trade, particularly in rice, and connection by steamer with Manila. Capiz is also a telegraph and military station. Pop. 13,676.

Cap'lin, or **Capelin,** a small savory smelt (*Mallotus villosus*), found in large numbers on the Arctic coast as far south as Cape Cod. The inhabitants of Newfoundland and Labrador catch it in large quantities at certain seasons, and many are dried and exported to Great Britain.

Capmany y Montpalau, Antonio de, ān-tō'-nē-ō dā käp mä nē ē mōnt-pạ-läṅ', Spanish critic and historian: b. Barcelona, 24 Nov. 1742; d. Cadiz, 14 Nov. 1813. He served in the wars with Portugal in 1762, left the army in 1770, and joined Olavide in his scheme for colonizing and cultivating the Sierra Morena. This enterprise terminated disastrously, and Capmany removed to Madrid, where he was chosen secretary of the Royal Historical Academy of Spain in 1790, and filled several offices in the gift of the government. He traveled in Italy, Germany, France, and England. When the French entered Madrid in 1808, he fled to Seville, arriving there destitute and in rags. He was chosen a member of the Cortes of Cadiz, in which capacity he made himself conspicuous by his patriotism and active opposition to the new rulers. His works, which enjoy a high reputation in Spain, are numerous; among them are 'Memorias historicas sobre la Marina, Commercio y Artes de la antiqua Ciudad de Barcelona'; 'Questiones criticas sobre varios puntos de historia, economica, politica y militar'; 'Teatro historico-critico de la Elocuencia Española'; and 'Dictionario Frances-Español.'

Cap'nomancy, divination by smoke, one of the modes of divination resorted to by the ancients. They used to burn vervain or some other sacred plant, and observe the form and direction which the smoke took in escaping, and from these circumstances they drew their auguries. Sometimes the smoke of sacrifices was observed instead of that of vervain. When this smoke was thin and transparent, it was considered a good omen; if, on the contrary, it was thick and opaque, the omen was bad. Another method of acquiring a knowledge of the future by capnomancy was to throw the seeds of jasmine or poppy on burning coals, and to observe the smoke which rose from them.

Capo d'Istria, Austria (the ancient ÆGIDA, later JUSTINOPOLIS), a seaport on the Gulf of Trieste, nine miles south of Trieste. It is connected with the mainland by a causeway rather more than half a mile long. It is defended by an old fort now going to decay. It contains a cathedral, a lofty edifice, faced in the Venetian

style with marble, and containing some fine paintings, sculptures, and arabesques. It is the seat of a bishop, and has six monasteries and two nunneries, a gymnasium, several hospitals, and a penitentiary. There are manufactories of soap, candles, leather, and sea-salt; and there is also a considerable trade in wines, oil, and fish. After the 10th century Capo d'Istria belonged, alternately, to the Venetians and Genoese, till finally, in 1478, it succeeded in making itself independent of the latter with the aid of the former. Capo d'Istria now became the capital of Istria, and along with it came into the possession of Austria in 1815. Pop. (1903) about 12,000.

Capo d'Istrias, or **Capo d'Istria, Ioannes Antonios,** yō-än'nēs än-tō'nyōs kä-pō-dēs'-trē-as, COUNT, Greek statesman: b. Corfu, 11 Feb. 1776; d. Nauplia, 9 Oct. 1831. His family had been settled in Corfu since 1373, but originally came from the Illyrian town of Capo d'Istria. He devoted himself to political life, and in 1809, after holding a high place in the Ionian Islands, entered the diplomatic service of Russia. Here his policy tended to the separation of Greece from Turkey. In 1828 he entered on a seven years' presidency of Greece; but whether from his attachment to Russian interests, or from the jealousy and impatience of restraint of the chiefs, he speedily became extremely unpopular. Several of these unruly chiefs belonging to the islands and to the province of Maina at last, in the spring of 1831, rose in open rebellion against him, demanding a convocation of the national assembly, the establishment of the liberty of the press, and the release of certain state prisoners, especially of Petros Mauromichalis, one of their own number whom D'Istrias had arrested and imprisoned. The president obtained the aid of Russia, but before the insurrection could be quelled he was assassinated in a church at Nauplia, by Constantine and George Mauromichalis, the brother and nephew of Petros Mauromichalis.

Caponière, kä-pō-nyār, or **Caponnière,** in fortification, a place covered against the fire of the enemy on the sides, sometimes also above, and serving for the connection of two works or for maintaining an important point. In particular:

1. A passage secured by two parapets, in the form of glacis, which leads through the dry ditch from one work to another; for instance, from the chief wall to the ravelin. If danger is to be apprehended only from one side, and consequently only one parapet is made, it is called a demi-caponnière; if it is covered above with hurdles or with wood, it is called a coffer: but this word is often used indifferently for caponnière.

2. Small block-houses in the covered way, for its defense. Coehorn laid out similar but less useful works below the glacis, and Scharnhorst proposes them, under the name of field-caponnières, for the salient angles of field fortification.

Capote, Domingo Mendez, dō-mēng'gō mēn-dāth' kä-pō'tā, Cuban statesman: b. Cardenas, 1863. He was graduated at the University of Havana, and became one of the best-known lawyers in Cuba. Susequently he was a professor in the University of Havana for many years. In December 1895 he joined the insurgents under Gen. Maximo Gomez; became a brigadier-general; and was appointed civil governor of Matanzas and of Las Villas. In November 1897 he was elected vice-president of the Cuban republic. When the Cuban Constitutional Convention appointed a commission of five members to confer with President McKinley and Secretary Root concerning the future relations of the United States and Cuba, he became its leader. The conference was held in Washington, D. C., in April 1901.

Capoul, Joseph Amédée Victor, zhō-zĕf a-mā-dā vĕk-tōr kä-pool, French tenor singer: b. Toulouse, 27 Feb. 1839. He was educated at Paris; and sang there in the Opéra Comique, 1861–72, where he was very popular, especially in his role as Gaston de Meillagré in Auber's 'Premier Jour de Bonheur.' He has also sung in New York, London, Vienna, St. Petersburg, and other cities, being everywhere very successful.

Cappadocia, kăp-pā-dō'shĭ-a, in antiquity, one of the most important provinces in Asia, once a famous kingdom; in its widest extent bounded west by Lycaonia, south by Cilicia and Syria, east by Armenia, and north by the Pontus Euxinus. In the period of the Persian government Cappadocia comprehended all the country between the Halys and Euphrates. By the former river it was separated from Phrygia and Paphlagonia; by the latter, from Armenia: therefore the region afterward called Pontus was comprehended in this territory. The Persians divided it, according to Strabo, into two satrapies, which bore the name of Cappadocia Magna, afterward Cappadocia Proper; and Cappadocia Minor, afterward Pontus. This division, however, was not always strictly observed. The Persian satraps governed, at a later time, under the title of kings, and sometimes made themselves independent. At the time of the famous retreat of the 10,000 Greeks, both the Cappadocias seem to have been under the rule of Mithridates, who had participated in the conspiracy of Cyrus the Younger, but retained his government and became, after the defeat of Cyrus, again dependent upon the kings of Persia. Cappadocia Magna was a good grazing country, and also well adapted for the cultivation of grain, especially wheat; but wood was scarce. Mazaca, afterward Cæsareia, now Kaisariyeh, was the residence of the kings of Cappadocia. The name of Leukosyri (White Syrians) is said by Strabo to have been applied to the Cappadocians, as if to distinguish them from the dark Syrians who dwelt to the east of Mount Amanus.

Cappel, kä'pĕl, Switzerland, a village in the canton of Zürich, and 10 miles from the town of Zürich. It contains an old Cistercian convent, founded in 1185, and a simple monument erected in 1838 to the reformer Zwingle, who was killed, 11 Oct. 1531, in a contest which took place near Cappel.

Cap'pon, James, Canadian educator: b. Scotland, 8 March 1854. He was educated at Glasgow University, and since 1888 has been professor of English language and literature at Queen's University, Kingston, Ontario. He has published 'Victor Hugo: a Study and a Memoir'; 'Britain's Title in South Africa.'

Capponi, Gino, MARCHESE, gē'nō mār-kā'zĕ kăp pō'nē, Italian scholar and historian: b. Florence, 14 Sept. 1792; d. there, 3 Feb. 1876. He traveled widely and devoted himself almost entirely to his studies in spite of the fact that he became blind early in life. For a short time in 1848 he was at the head of the Tuscan government; in 1859 he was a member of the Constitutional Convention of Tuscany; he was also made a senator of Italy; and in 1862 was at the head of the Historical Commission for Tuscany, Umbria, and the Marches. He wrote 'Storia della Repubblica di Firenze' (1875); and had a part in the preparation of a lexicon by the Accadamia della Crusca, and in the editing of texts of Dante's 'Divine Comedy.'

Capps, Edward, American philologist: b. 21 Dec. 1866. He was graduated from Illinois College, 1887; took his doctor's degree at Yale, 1891; and was tutor in Latin at the latter place, 1890–2. Since then he has been successively associate professor and professor of Greek in the University of Chicago. Besides a number of philological papers, he has written 'From Homer to Theocritus' (1891).

Caprara, Giambattista, jäm-bät-tēs'tä kä-prä'rä, CARDINAL, Italian ecclesiastic: b. Bologna, Italy, 29 May 1733; d. Paris, 21 June 1810. He studied theology, became vice-legate of Ravenna in 1758 under Benedict XIV., and in 1785 was sent by Pius VI., as nuncio to Vienna, to remonstrate with the Emperor Joseph on his conduct in relation to Church matters. His remonstrance proved ineffectual, but in 1792 he was appointed a cardinal, shortly afterward a member of the state council, and in 1800 bishop of Jest. In 1801 he went to Paris as legate of Pius VII., and conducted the negotiations with the French republic with so much success that in 1802 the first concordate was concluded. Shortly after he was appointed archbishop of Milan, and in 1805 he crowned Napoleon king of Italy.

Caprera, kä-prā'rạ, a small island in the northeast of Sardinia, and separated from it by a narrow strait. It is six miles long from north to south, and two miles broad. It is fertile, and produces both corn and good pasture. It is well known as the ordinary residence of Garibaldi, who since 1854 possessed a dwelling-house on the island, along with a piece of ground which he farmed until his death here in 1882.

Capri, kä'prē, an island in the beautiful Gulf of Naples, which contributes not a little to the charms of this favorite scene of nature. Capri, five miles long and two broad, lies at the entrance of the gulf, and consists of two mountains of limestone, remarkable for their picturesque shape, and a well-cultivated valley. The inhabitants, amounting to 4,600, are occupied in the production of oil and wine, in fishing, and in catching quails, which come in immense numbers from Africa to the shores of Italy. Every spot on the island which can be made productive is cultivated. In fact, agriculture all around Naples is in the highest state of perfection. The town of Capri is the seat of a bishop, to whom all the quails belong. A high rock separates Capri from the little town of Anacapri, which is reached by 522 steps cut in the rock. With the Romans Capri was called Capreæ. Augustus obtained it from the Neapolitans in exchange for Ischia, and made it a place of agreeable retreat, but never made use of it. Tiberius spent here the last seven years of his life in degrading voluptuousness and infamous cruelty. The ruins of his palaces are still extant, and other ruins are scattered over the island. The island of Capri is remarkable for several remarkable caverns or grottoes in its steep, rocky coast. By far the most remarkable of these is unquestionably the celebrated Grotta azzurra (Blue Grotto), which was discovered by a singular accident in the summer of 1832, an Englishman while bathing having observed the opening in the rocks which forms the entrance to the grotto, and swum into it. It gets its name from the fact that, while the sun is shining outside, all the objects within the cavern — rocks, water, and sand — are tinged with a beautiful blue color, very soft and agreeable to the eye. The cavern is elliptical in form, measuring about 1,200 or 1,300 feet in circumference; its height is considerable, and its roof and sides bristle with stalactites. The blue color within the grotto is supposed to be caused by the refraction of the rays of light in passing through the water before entering the cave. The blue rays, with those next to them, the violet and the indigo, being the most refrangible, are the only rays that are admitted, the others — red, orange, etc., being dispersed in the water. In another part of the coast there is another grotto which exhibits phenomena precisely similar, except that the objects in this one are clothed with a green instead of a blue color. It is hence called the Grotta verde (Green Grotto).

Cap'ric Acid. See DECOIC ACID.

Capriccio, kä-prē'chō (*Caprice*), is the name applied to a musical composition, in which the composer follows the bent of his humor. The *capriccio* may be used with propriety in pieces for exercise, in which the strangest and most difficult figures may be introduced, if they are not at variance with the nature of the instrument or of the voice.

Capricor'nus (Lat. *caper*, "a goat," and *cornu*, "a horn"), "the goat," one of the 12 signs of the Zodiac, between Sagittarius and Aquarius; also the corresponding zodiacal constellation, one of Ptolemy's original 48. One of its brightest stars, Alpha, is a wide double, easily separated by the naked eye by any one with good eyesight. Capricornus is surrounded by Aquila, Aquarius, Piscis Austrinus, Microscopium, and Sagittarius.

Caprification, kăp-rĭ-fĭ-kā'shŏn, the fertilization of the flowers of the Smyrna fig with pollen derived from the wild fig, or caprifig. From time immemorial it has been the custom of Orientals to break off the fruits of the caprifig, bring them to the edible-fig trees, and tie them to the limbs. From the caprifigs thus brought in there issues a minute insect, which, covered with pollen, crawls into the flower receptacles of the edible fig, fertilizes them, and thus produces a crop of seeds and brings about the subsequent ripening of the fruit. It has been shown that the varieties of the wild fig or caprifig are the only ones which contain male organs, while the varieties of the Smyrna fig are exclusively female. In the caprifig there are said to exist in Mediterranean regions three crops of fruit,— the spring crop, a summer crop, and a

third, which remains upon the trees through the winter. The fig-insect (*Blastophaga grossorum*) over-winters in the third crop, oviposits in the spring crop, develops a generation within it, each individual living in the swelling of a gall-flower (a modified and infertile female flower), and, issuing from it covered with pollen, enters the young flower receptacles of the young Smyrna fig, which are at that time of the proper size, and makes an attempt to oviposit in the true female flowers, fertilizing them at the same time by means of the pollen adhering to their bodies. The life history of the insect from that time on is not well understood, but the *Blastophaga* has been known to occur again in the over-wintering crop of figs. The effect of caprification on the young Smyrna figs becomes readily visible within a few days; before the *Blastophaga* enters the fig the latter is transverse and strongly ribbed, while a few days after fertilization the fig swells up and becomes rounded and sleek. The male *Blastophaga* is always wingless. It has no ocelli, and its compound eyes are greatly reduced in size. The fact that the male rarely leaves the fig in which it has hatched might almost be inferred from these facts of winglessness and partial blindness. When this wingless male issues from the seed-like gall in which it is contained, it seeks a female gall in the interior of the same fig, gnaws a small hole through its cortex, inserts its extremely long, almost telescopic, abdominal extremity through the hole, and fertilizes the female. The female subsequently, with her powerful jaws, gnaws the top of the gall off and emerges, crawling around the interior of the fig, and eventually forcing her way through the ostiolum, almost immediately seeking for young figs, which she enters, and, should the fig entered prove to be a caprifig, lays her eggs at the base of as many flowers as she can find, and then dies. Should the fig entered, however, be a Smyrna fig, either through the fact of the caprifig from which she issued having been hung in the branches of a Smyrna-fig tree, or from the fact that she has flown to an adjoining Smyrna-fig tree, she walks around among the female flowers seeking for a proper place to oviposit. It is this futile, wandering search, when her body is covered with pollen from the caprifigs, that produces the extensive and almost perfect fertilization of the entire number of female flowers. The young larva is a delicate little maggot curved upon itself and showing no visible segmentation. In the full-grown larva the segments are more apparent, and with the growth of the larva the gall at the base of the male florets becomes hard, and greatly resembles a seed, turning light brown in color. The male and the female pupa each occupies a greater portion of the interior of the gall. Consult: 'The Fig' (United States Department of Agriculture, Washington 1901).

Although figs are raised in California and the southern States they have long been inferior to the Smyrna fig, the standard kind of commerce, which owes its peculiar flavor to the number of ripe seeds which it contains. These seeds are obtained only by the process described above, and the United States Department of Agriculture has recently devoted much attention to caprification, with a view to the development of the American fig industry.

Caprimulgidæ, kăp-rĭ-mŭl'jĭ-dē, the goatsuckers (so called from a superstition regarding their habits), a family of birds of puzzling affinities, but nearest to the swifts (*Cypselidæ*), with which, and the humming-birds, they are often considered to constitute an order, *Macrochires*. The family is characterized by a small bill, enormous gape fringed with elongated, stiff bristles, elongated tail of 10 soft rectrices, long pointed wings, very small feet with the middle claw pectinate, and very lax plumage. Two subfamilies, the *Caprimulginæ* or true goatsuckers, and the *Nyctibiinæ* of tropical America, are recognized, to which the oil-birds (*Steatornis*), and *Podargus* and its allies, are sometimes added as two more. The family is nearly cosmopolitan, and comprises 12 or 15 genera and perhaps 100 species, all birds of more or less crepuscular habits, which catch insects on the wing like swallows. The «night-hawk» and «whip-poor-will» are the common species of the eastern United States.

Caprivi, Georg Leo, gā ōrg lā ō kā-prē'vē, Graf von, sometimes called Caprivi de Caprara de Montecuculi, German soldier and statesman: b. Charlottenburg, 24 Feb. 1831; d. Skyren, 6 Feb. 1899. He entered the army in 1849; fought in the campaigns of 1864 and 1866; and in the Franco-German war of 1870 was chief of staff to the 10th Army Corps. In 1883–8 he was at the head of the Admiralty; in 1888 he became commander of his old army corps. Hence he was removed, on the fall of Bismarck, in 1890, to become imperial chancellor and Prussian prime minister. His principal measures were the army bills of 1892 and 1893, and the commercial treaty with Russia in 1894, in which year he retired.

Capro'ic Acid. See Hexoic Acid.

Capron, Allyn, American soldier: b. Tampa, Fla., 27 Aug. 1846; d. Fort Myer, Va., 18 Sept. 1898. He was graduated at West Point, 1867, and entered the 1st Artillery, receiving his captaincy 4 Dec. 1888. During the Sioux campaign of 1890 he made a brilliant record at the battles of Wounded Knee and Drexel Mission. During the war with Spain, 1898, he opened the fight at El Caney, Cuba, and shattered the first flagstaff in Santiago. During this campaign he was taken ill with typhoid fever, and succumbed to its attack. He was a fine mathematician, and a recognized authority on artillery and tactics. His father, Erastus Allyn Capron was killed at Churubusco, in the Mexican war, 20 Aug. 1847.

Ca'pron, Allen Kissam, American military officer (son of Allyn Capron, q.v.): b. Brooklyn, N. Y., 24 June 1871; d. Las Guasimas, Cuba, 24 June 1898. He enlisted as a private (1890), and rose to a second lieutenancy (1893), joining the «Rough Riders» on the outbreak of the war with Spain. He was made a captain for bravery, and was the first American army officer who fell in that war.

Capryl'ic Acid. See Octoic Acid.

Cap'sicin, kăp'sĭ-sĭn, a name given to two apparently different substances. One described by Braconnot, obtained from chilli pepper, is an acrid oil or oleoresin, of a reddish-brown color, the vapor of which excites sneezing and coughing. It is probably a mixture of different bodies. The other is a resinoid substance ob-

tained from cayenne pepper; it is brown with a golden tint, has the consistence of tar, an aromatic smell and pungent taste, and is used in America as a powerful stimulant in influenza, fever, indigestion, and other disorders, and externally as a rubefacient. Quite recently a volatile alkaloid has been obtained from chilli pepper, by first removing the acrid resin, then making the fluid alkaline, and extracting with petroleum spirit. On evaporating, a substance is produced with an odor like that of conia. It is distinguished from conia and nicotine by a variety of reactions.

Capsicum, a genus of plants of the order *Solanaceæ,* consisting of annual or biennial plants, bearing membranous pods containing several seeds, noted for their hot, pungent qualities. *C. annuum,* a native of South America, furnishes the fruits known as chillies. These, as well as the fruits of *C. frutescens* and other species, are used to form cayenne pepper. For this purpose the ripe fruits are dried in the sun or in an oven, and then ground to powder, which is mixed with a large quantity of wheat flour. The mixed powder is then turned into cakes with leaven; these are baked till they become as hard as biscuit, and are then ground and sifted. Cayenne pepper is largely adulterated with red lead and other substances. *C. fructus* is the dried ripe fruit of *C. fastigiatum,* imported from Zanzibar. It is a small, oblong, scarlet, membranous pod, divided internally into two or three cells containing numerous flat, white, reniform seeds. It has no odor; its taste is hot and acrid. Capsicum fruits are used medicinally, in powder or as a tincture, externally, or as a gargle in cases of malignant sore throat, and internally as a stimulant in cases of impaired digestion.

By reason of the resin-like body, capsicin, which is contained in the fruits of these plants, they possess very active irritant properties. The pure crystals of capsicin are extremely virulent, and readily cause severe poisoning; but the ground fruit is less active, and is of service in medicine, both for external and internal medication.

Externally, capsicum is used as an irritant to cause redness of the skin or to blister, thus affecting related visceral areas within the body. It is thus employed in bronchitis, in early stages of pneumonia, in pleurisies, and in joint and nerve affections. Internally, capsicum is used to stimulate the appetite and to increase the amounts of gastric and intestinal juices. It is particularly serviceable in the gastritis of alcoholism. All capsicum should be excluded from the diet of patients with disease of the kidneys or acute disease of the genito-urinary system.

Cap'stan (Fr. *cabestan,* probably from a derivative of Lat. *capistrum,* a halter, from *capere,* to hold), an apparatus constructed on the mechanical principle of the wheel and axle, used for moving heavy weights and by various methods for the application of power. Its axis, unlike that of the windlass, is vertical. The capstan may be operated either by steam-power or by means of a lever set in its socket and worked by horses or pushed by hand, the last method usually requiring several men. When used elsewhere than on shipboard, the capstan generally has some specific name. Thus, when employed for raising coal from pits it is commonly called a gin; if worked by horses, it is known as a whim-gin. Capstans were formerly made of wood, but are at present almost universally of iron. The upright barrel of a capstan is constructed around a spindle. The barrel is sometimes smooth, and sometimes for increase of friction has, running up and down its surface, ribs or ridges called whelps. In the capstan-head or drum-head, surmounting the barrel, are holes for the levers or capstan-bars used to revolve the barrel. Being smaller at its centre than at the top or bottom end, the barrel has a curve from above and below, whereby a rope wound by working the capstan slips toward the concave part so formed. By this device a length of rope may be compactly and securely wound and kept in place for repeated use. On the circumference of a pawl-head at the bottom of the barrel are pivoted pawls which catch a pawl-rim or ratchet-ring fastened to the platform or floor on which the capstan is fixed. There are various other devices for increasing friction, the prevention of slipping, and reverse operation of the mechanism.

Cap'sule, in botany, a dry fruit containing several seeds, sometimes a large number, and opening of itself by means of valves or pores when it comes to maturity. According as it contains one, two, three, or more cells, the capsule is called unilocular, bilocular, trilocular, etc., and when it has many cells it is called multilocular.

In anatomy a capsule is a mass of fibrous, connective tissue cells surrounding or supporting an organ, either as a bag, as is the case in the kidneys; or as a framework, as in the liver. The capsule is usually an integral portion of the structure of an organ.

In pharmacy gelatin capsules are widely used for purposes of rendering medicines tasteless.

Captain. This is one of those many words derived from the Latin of the Middle Ages, and now to be found in all the different idioms of Europe. Captain comes from the Latin *capitaneus,* from *caput,* head, and signified, first, a governor of a province, who in the first half of the Middle Ages was generally a military man. Thus the word captain soon came to be used chiefly to denote a high, or rather the highest military officer. Like many other words, however, this has in the course of time lost much of its dignity, and in military technology now signifies the commander of a small body, a company, and in maritime language the master of a vessel. In the navy it indicates a specific rank, the captain being distinctively the officer commanding a war-vessel. In the latter part of the Middle Ages, when armies were not yet so regularly divided and subdivided as at the present time, captains were the commanders of those small bodies of which the armies consisted. These were generally collected by their commander, who entered with his company into the service where most pay or most booty could be obtained. The practice of carrying war by troops collected in this manner prevailed to the greatest extent in Italy, where the continual quarrels of the numerous small states afforded ample employment to the unsettled and the dissolute. These companies play an important part in the history of the Middle Ages, particularly that of the two centuries preceding the Reformation, and had a very important influence on

the manners and morals of the south of Europe. They are further interesting to the student of history, because they are so unlike anything at present existing.

CAPTAIN, in modern armies, is the commander of a company of foot or a troop of horse. In the United States army he nominates the sergeants, corporals, and lance-corporals of his company, who are appointed by the commander of the regiment.

CAPTAIN, in the navy, an officer commanding a ship of war. The naval captain is next in rank above the commander, and in the United States ranks with a colonel in the army.

CAPTAIN-GENERAL, the commander-in-chief of an army or of all the military forces of a country. In France it was an ancient title which conferred an almost unlimited power on the person who possessed it in the district where he commanded. But it never corresponded to that of generalissimo except in the case of the Duke of Savoy, in 1635, in the time of Louis XIII. The title is not in use at present, nor would it agree with the existing organization of the administration. In Spain the rank of a captain-general corresponds with that of a marshal of France, the captain-general having command of an army or army-corps. The title was also given to the head of a province in the Spanish colonies in South America, which were divided into viceroyalties and captain-generalships (*capitanias-generales*); thus Chile used to be a captain-generalship. The captains-general were not placed under the viceroys, but accountable only to the king through the council of the Indies. The captain-general of Venezuela, for instance, had no connection with the viceroy of New Granada. They decided, in the last instance, on all legislative, judicial, and military affairs, and presided in the *real audiencia*. The time during whch these governors remained in power was limited to a few years, probably in order to prevent them from becoming too powerful. The consequence was, that the colonies were oppressed the more to enrich the governors, for rich every one was when he left his office.

CAPTAIN of a merchant ship, he who has the direction of a ship, her crew, lading, etc. In small vessels he is more ordinarily called master, which indeed is the correct title.

Caption, in law, signifies that part of a legal instrument such as an indictment or commission, which states when, where, and by what authority it is executed. In Scotch law it signifies a warrant of imprisonment issued against a party to enforce an obligation, being now confined to a warrant served upon a party who has illegally retained papers in a lawsuit that had been borrowed by him, and intended to compel the return of the papers.

Capua, kā'poo ā, Italy, a city in the province of Caserta, 18 miles north of Naples, on the Volturno, which is crossed by a handsome bridge. The district is very fertile, but somewhat unhealthy. It is the seat of an archbishopric, and is the principal fortress that covers the approach to Naples. It has two magnificent gates, three principal streets, two handsome squares, and three public fountains. The town is dirty and badly built. The principal public buildings are the cathedral, with a cupola supported by 18 columns, entirely modernized; the church of the Annunciation; the governor's palace, the town-hall, a museum with many ancient works of art, etc. The ancient city was situated two and a half miles southeast from the modern town, which was built from its ruins on the site of the ancient Casilinum by the Lombards in the 9th century. The site is now occupied by a considerable town, called Santa-Maria-di-Capoa-Vetere. The ancient Capua, one of the finest and most agreeable cities of Italy, was of such extent as to be compared to Rome and Carthage. Hannibal wintered at ancient Capua after the battle of Cannæ, and thus not only lost time, but also is commonly said to have rendered his army unfit to follow up the advantage he had gained. It was a favorite place of resort of the Romans, on account of its agreeable situation and its healthy climate; and many existing ruins attest its ancient splendor. In 456 A.D. it was devastated by the Vandals under Genseric, and in 840 the Saracens completely destroyed it. Pop. about 14,000.

Capuana, Luigi, loo-ē'jē kä-poo-ä'nä, Italian poet, novelist, and critic: b. Mineo, Sicily, 27 May 1839. Having devoted himself to journalism, he settled in Florence in 1864, where he wrote dramatic criticisms; from 1868 until 1877 he lived in his native town, then in Milan, again as a journalist. His best-known work is 'Giacinta' (1879), a naturalistic novel. Besides this he has published several volumes of short stories, among them: 'Profiles of Women' (1881); 'Homo' (1883); and two collections of charming fairy tales: 'Once upon a Time' (1882) and 'Fairy Land' (1883). A curious specimen of rhythmical prose is his 'Semi-Rhythms' (1888), in praise of worldly joy and beauty.

Capuchin, kăp ū shĕn or kap ū chĕn, the name of several animals in which the growth of the hair or feathers upon the head forms a sort of hood suggesting that of a Capuchin friar. Certain monkeys are so called, especially the South American sapajous (q.v.) and one or more of the macaques (q.v.). A breed of domestic pigeons is also so called.

Capuchins, an order of mendicant friars in the Roman Catholic Church founded in 1528 in virtue of a bull of Clement VII. Its founder, Matteo Barro, was a member of the rigorist section of the Observantine Franciscans, who sought to restore the rule of perfect poverty and humility, and to be of aid to parish priests in the cure of souls. The Capuchin friars obtained their name from the capuerce, cowl, or hood which they wore. They were vowed to live according to the rule of St. Francis in hermitages and to labor for the conversion of notorious sinners. Their churches were to be bare of ornament. Soon after their foundation they did heroic service in ministering to those stricken by the plague which at that time ravaged all Italy. The third vicar-general of the order, Bernardino Ochino (q.v.) brought the Capuchins into discredit by his notorious leanings toward protestantism, and the fraternity was interdicted from preaching by Paul III., and would have been suppressed had not Cardinal Sanseverino, archbishop of Naples, interceded for them. Paul also forbade them to establish any convents beyond the Alps, but his successor, Gregory XIII., revoked that decree. Again, Gregory XIV. in 1591 withdrew from them the fac-

ulty of ministering in the confessional; but it was restored to them 10 years later by Clement VIII. Finally, in 1619 the fraternity was restored to good standing, and was even erected into an order administratively independent of the general of the Franciscans, and their vicar-general assumed the style of minister-general. Ever since, the Capuchins have been recognized as eminently useful servants of the Church. The order conducts missions in all quarters of the globe, and has the reputation of being very successful in winning converts.

Cap'ulets and Mon'tagues, the English spelling of the names of the Cappelletti and Montecchi, two noble families of northern Italy, according to tradition of Verona, chiefly memorable from their connection with the legend on which Shakespeare has founded his tragedy of 'Romeo and Juliet.'

Ca'put Mor'tuum (Latin), literally, a dead head; a fanciful term much used by the old chemists to denote the residuum of chemicals when all their volatile matters had escaped; hence the word is figuratively used of anything from which all that rendered it valuable has been taken away.

Caputiati, kă-pū-shĭ-ā'tī, a Christian sect which arose in France in the 12th century. They wore on their heads a leaden image of the virgin Mary. They wished liberty, equality, and the abolition of all civil government. Hugo, bishop of Auxerre, suppressed them by military force.

Capybara, kă-pē-bä'ra, an aquatic rodent (*Hydrochoerus capyoara*), of the family *Caviidæ*, native to South America. It is the largest rodent known, being four feet long, and weighing nearly 100 pounds. It has a rough brown coat, a heavy flat head, small, pig-like eyes and ears, and a blunt muzzle. Its feet are supplied with hoof-like claws, and its tail, unlike that of most rodents, is very short. The animal is herbivorous, browsing on grass along river banks, and often creating havoc in sugar plantations. It is awkward on land, but swims and dives well, and can remain under water a long time. The flesh is edible, except that of very old males.

Carabao, kä-ra-bä'ō. See BUFFALO.

Car'abas, Marquis of, the exalted personage who figures in Perrault's story of 'La Chat Botté' ('Puss in Boots'). The name is often applied to an extremely conservative aristocrat. In Disraeli's 'Vivian Grey' the Marquis of Clanricarde is satirized as the Marquis of Carabas.

Carabidæ, the family of *Coleoptera*, comprising the ground-beetles. In form the species vary greatly; the antennæ are inserted behind the base of the mandibles under a frontal ridge; maxillæ with the outer lobe palpiform, usually biarticulate, while the inner lobe is usually curved, acute, and ciliate, with spines. The epimera and episterna of the prothorax are usually distinct; the three anterior segments of the abdomen, usually six, rarely seven or eight in number, are connate. The legs are slender, formed for running; anterior and middle coxæ globular, posterior ones dilated internally, and the tarsi are five-jointed. They are, with few exceptions, predaceous and carnivorous beetles; they are runners, and do not fly, the hind wings being often absent. Their colors are dull metallic or black. They run in grass, or lurk under stones or the bark of trees, whence they go out to hunt in the night-time. The larvæ are found in much the same situations as the adult beetles, and are generally oblong, broad, with the terminal ring around, with two horny hooks or longer filaments, and with a single false leg beneath. *Carabus serratus* and *Calosoma calidum* are common examples.

Car'abine, or **Carbine.** See RIFLE.

Carabobo, kä-ra-bō'bō, a state of Venezuela, bounded on the north by the Caribbean Sea; area, 2,984 square miles. The capital is Valencia, and the chief port Puerto Cabello. Coffee, cacao, and sugar are cultivated. The village of Carabobo, 20 miles southwest of Valencia, was the scene of the battle fought 24 June 1821, which was decisive of the independence of Colombia. Caracas, La Guayra, Carthagena, Cumana, and all that portion of Venezuela which is dependent upon them, were permanently secured to the patriots by this victory. Pop. (1900) 225,000.

Caracal, kăr'a kăl, a lynx-like wild cat of Africa and southern Asia, slender in form and usually red-brown in color. See LYNX.

Caracal'la, Roman emperor: b. Lyons, 188 A.D.; d. 217. His real name was MARCUS AURELIUS ANTONINUS BASSIANUS, and he was the eldest son of Septimius Severus. On the death of his father he succeeded to the throne with his brother, Antoninus Geta, whom he speedily murdered. To effect his own security upward of 20,000 other victims were butchered. He was himself assassinated by Macrinus, the pretorian prefect, near Edessa, in 217. Among the buildings of Caracalla in Rome, the baths — *Thermæ Caracallæ* — near Porta Capena, were most celebrated, and their ruins are still magnificent.

Caracara, kä-ra-kä'ra, a genus of large carrion-eating hawks of the tropical parts of America, with black and white plumage, the head somewhat crested, legs long and naked and the general aspect vulture-like. They have increased greatly with the spread of the cattle-raising industry in South America, and have proved of much service as scavengers about the ranches and villages. The species to which the name most strictly applies is *Polyborus cheriway*, which is found from Venezuela to Texas and southern California. Another prominent species is the carancho (*P. tharus*) numerous and well known all over Brazil and Argentina. Darwin gives interesting facts in regard to this and related vulture-hawks in his journal. Compare CHIMANGO.

Caracas, kä-rä'käs, city and capital of the United States of Venezuela, was founded in 1567 by Diego de Lozada, who called the city Santiago de Léon. But in popular usage a more distinctive name was adopted — that of the Caracas tribe of Indians, formerly inhabiting the valley in which the city is built. Its altitude being about 3,000 feet above sea-level, the climate is generally mild and agreeable, the temperature seldom rising above 82° F. (with 84.2 as a maximum), or falling below 65° F. (with a minimum of 48.2). Toward the end of December the temperature is lowest, and it is highest from June to September. Mean temperature, 66.2° F. Lat. 10° 32′ N., lon. 67° 4′ 45″ W.

The streets cross each other at right angles, running due east and west, or north and south, and the principal thoroughfares are paved with stone, and have sidewalks of cement. The capitol building occupies an entire square, an area of more than two acres. It includes the halls in which both chambers of the national congress hold their sessions. The rooms of the high federal court, and the departments of public instruction and the interior are in the galleries on the east and west sides of the capitol. *La Casa Amarilla* (the Yellow House), official residence of the president of the republic, is situated west of the Plaza Bolivar. On the north side of the same square is the main post-office. Near by are the archbishop's palace, the cathedral, and the municipal palace. Opposite the southern façade of the capitol are the university buildings (Gothic architecture, with interior gardens); the old temple of San Francisco, and the Exposition Palace, the western wing of which contains the Bolivar Museum, the headquarters of the Academy of History, and the corresponding branch of the Spanish Royal Academy. The national library and museum are housed by the university. Other characteristic buildings are: The National Pantheon, the Masonic Temple, the three markets, the National Benevolent Institute, the Arsenal, the Institute of Arts and Trades, and the Municipal Theatre. Besides the Plaza Bolivar, the principal public squares are the Washington, Pantheon, and Fifth of July (Independence Day). The cathedral, dating from 1614; the Basilica de Santa Ana, and the Santa Capilla, are noteworthy among the churches of the city. Interesting relics of the heroes of the struggle for liberty, Miranda, Bolivar, and Páez, are shown in the National Museum. There are several promenades (called "Iron Bridge," "Paradise Avenue," and "Independence"), and among the places of amusement are a Plaza de Toros, baseball grounds, and a bicycle park. An important institution supported by the government is the Vargas Hospital. The Linares Hospital for children is maintained by private contributions. Leading clubs are the Union, German, Italian, and Agricultural. Street railways are controlled by the Caracas and Bolivar companies. The city has cheap telephone service, furnished by two companies, and is lighted by gas and electricity. All telegraph lines throughout the republic are owned by the government. Four lines of railway start at Caracas, three of which are designed to place the capital in communication with the interior, while the most important runs to Port La Guayara. Pop. including the six suburban parishes making up the federal district is about 90,000.

Caracci. See CARRACCI.

Caraccioli, Francesco, frän chēs'kō kä-rä-chō'lō, Italian admiral: b. Naples, 1752; d. 29 June 1799. He was distinguished in the Neapolitan service, but entered the service of the Parthenopean Republic set up by the French republicans in 1799, and repelled a Sicilian-English fleet. When Ruffo took Naples, Caraccioli was arrested, and being tried by court-martial was condemned to death, and hanged at the yard-arm of a Neapolitan frigate. The court-martial was ordered by Nelson, to whom the king had given command of the Neapolitan navy.

Carac'tacus, British king. He was a son of Cunobelin, king of the Trinobantes, and in 43 A.D., when Plautius landed, was at the head of the Catuvellauni. Plautius and his lieutenant Vespasian, who afterward became emperor, defeated the British forces under Caractacus on several occasions, the chief battle probably taking place about Wallingford. When the Romans had pushed well down the Thames the Emperor Claudius arrived and took part in further military operations, but his stay was a very short one. Caractacus now established himself in South Wales among the Silures, whence he took every opportunity of harassing the Romans. In 47 A.D. Plautius was replaced by Ostorius Scapula, and that commander completely defeated Caractacus in a battle somewhere about Shropshire, probably at Caer Caradoc. The wife, daughter, and brothers of the British leader were captured, and Caractacus himself fled to the country of the Brigantes in the north, only to be delivered up by their queen Cartismandua into the hands of the Romans. He was taken to Rome and made to take part in a triumphal procession. Here he was led before the Emperor Claudius and an assembly of the people. When he came to the seat of the emperor he stopped and addressed him, and so won upon the monarch by his noble behavior and pathetic speech that the other pardoned him. According to the Welsh Triads he lived four years longer, and his children became Christians and introduced Christianity into Britain. He is introduced among the dramatis personæ of Beaumont and Fletcher's play, 'Bonduca.'

Caradoc Sandstone, the name given by Murchison to a thickness of about 4,500 feet of sandstones, shales, grits, flags, and sandy limestones on the border between England and Wales, which he made a separate series. Subsequent investigation has shown that the Caradoc series is of the same age as the Bala, and the series is sometimes called Bala and Caradoc by English geologists. The rocks are of the Ordovician system. See ORDOVICIAN.

Carafe, kă-raf', the French name for an ordinary glass bottle or decanter for holding drinking water.

Caraffa, kä räf'fä, a celebrated Neapolitan family, which has produced several distinguished commanders and statesmen: 1. OLIVIERO, b. 1406; d. Rome, 1511. He was made a cardinal by Pope Paul II. in 1467. Sixtus IV. appointed him his legate to Alfonso of Naples, and in 1472 made him admiral of his fleet against the Turks, from whom he captured Smyrna, and the port of Satalia in Asia Minor. 2. CARLO, b. Naples, 1517; d. 1561. He served first in the Netherlands under the Spaniards, then entered the order of Malta, and was made a cardinal by his uncle Pope Paul IV., who, for his sake, stripped the Colonnas of their possessions. This involved them in a war with Philip of Spain, but the result proved favorable to the Caraffa family. Paul IV. was succeeded by Pius IV., who was a bitter enemy of the Caraffas, imprisoned them, and then caused the cardinal to be strangled. 3. ANTONIO, b. Naples, 1538; d. 1591. He was made cardinal by Pius V., and intrusted with the superintendence of the congregation for the revision of the Bible, and an Exposition of the Canons of the Council of Trent. Under Gregory XIII. he became libra-

rian of the Vatican. He translated Theodoret's Commentaries on the Psalms, and the Orations of Gregory Nazianzen from Greek into Latin. 4. ANTONIO, another member of the family, distinguished himself in Hungary in the service of Austria, but made himself universally hated by his cruelty. D. Vienna, 1693.

Carambola, kä-ram-bō'la, the fruit of an East Indian tree of the same genus as the bilimbi, the *Averrhoa Carambola,* order *Oxalidaceæ.* It is of the size and shape of a duck's egg, of an agreeable acidulous flavor.

Car'amel. When sugar is gradually heated, it loses water and other substances, and is converted into a dark mass with a characteristic smell and taste. This is crude caramel, which is used in cookery as a coloring and flavoring ingredient. It is a mixture of several bodies, of which three have been described: Caramelane, a brown bitter body, soluble in water; Caramelene, a dark brown body, also soluble in water, and possessed of great tinctorial power; and Caramelin, a black substance, of intense coloring power, which exists both in a soluble and insoluble modification.

Carangidæ, kä-răn'jĭ-dē, a family of marine fishes, the pompanos. Among the more widely known members of the family are the leather jackets, pilot fishes, amber fishes, runners, horse mackerels, crevallés, moonfishes, and pompanos. There are about 200 species in the family, and nearly all are good for food. They abound in the warmer seas, and many of them are remarkable for their graceful or strange forms.

Car'apa, a small genus of tropical trees of the natural order *Meliaceæ,* with mostly imparipinnate leaves and regular flowers. A South American species (*C. guianensis*) is a fine large tree, whose bark is in repute as a febrifuge. Oil made from its seeds (called carap-oil or crab-oil) is used for lamps, and masts of ships are made from its trunk. The wood is called crab-wood. The oil of the African species (*C. tolucana*), called *coondi, kundah,* or *tallicoona* oil, is used by the negroes for making soap and anointing their bodies in order to protect them against insects. The oil of the South American carapa is used for the same purpose also.

Car'apace, the upper part of the hard shell or case in which reptiles belonging to the order of the *Chelonia* are enclosed, the lower part being called plastron. The same name is also given to the upper part of the shell of the Crustacea, and to the case inclosing certain of the *Infusoria.*

Car'at is said to have derived its name from *qirrât,* which in Arabic signifies the pod of a leguminous plant, the seeds of which have, from time immemorial, been used in the East in weighing gold, because they never vary in weight when once dry. It is a weight of three and a sixth troy grains, used in weighing pearls and precious stones, and also serves to express the relative fineness of gold. Twenty-four carats being assumed as the standard of gold perfectly free from alloy, every specimen, in proportion as it falls short of this purity, has a fineness of less than 24 carats — for example, if the alloy amounts to a sixth of the whole, it is 20 carats fine; or to a fourth, it is 18 carats fine.

Carausius, kä-rô'shĭ-ŭs, Roman general: b. among the Menapii, in Gallia Belgica. He was sent by the Emperor Maximian to defend the Atlantic coasts against the Franks and Saxons; but being suspected of permitting those pirates to commit their ravages in order to increase his own plunder when he afterward captured their vessels, and foreseeing that he was likely to fall into disgrace, he landed in Britain and had himself proclaimed emperor by his legions (287 A.D.). In this province he was able to maintain himself six years, when he was assassinated by one of his officers named Allectus (293 A.D.).

Caravaca, kä-ra-vä'ka, Spain, a town in the province of Murcia, and 43 miles west by north of the town of Murcia. It occupies the side of a hill crowned by an ancient castle, and overlooking the river Caravaca, here crossed by a stone bridge; is well built, and has a handsome town-house and church, the latter with a lofty tower and some good sculptures and paintings. Its trade is chiefly in cattle, grain, and manufactures of woolen and hempen goods, paper, soap, earthen and copper ware. Pop. 16,000.

Caravaggio, da, Michelangelo Amerighi, or **Merighi,** mē'kĕl än'yō lō ä-mĕr-ē'jē or mĕr'ē jē kä rä väd'jō, Italian painter: b. Caravaggio, in the Milanese, 1569; d. near Porto Ercole, 1609. He was at first a journeyman mason, but soon applied himself to the study of painting, studied in Milan and Venice, and afterward went to Rome, where he distinguished himself. He may be considered as the inventor of a manner which has had a crowd of imitators. His characteristic traits are vigor and truth of *chiaroscuro,* combined with excellent coloring. He was fond of introducing broad and deep masses of shade, whereby a great effect is given to the light. To aid him in producing this effect the room in which he worked was illuminated by a skylight, and the walls were painted black. He excelled in the painting of naked figures. His faults are obvious. Narrow and servile imitation of nature was his highest aim. Annibale Caracci and Domenichino were, perhaps, less distinguished than Caravaggio during their lives, but after their death were ranked higher; because, without neglecting coloring and the study of nature, they aimed at correctness of design and dignity of conception. His violent character involved him in many difficulties. He died in consequence of wounds received in a quarrel in which his violent nature had involved him. The painters who have imitated him most are Manfredi, Valentin, and Ribeira, called *Espagnolet.*

Caravaggio da Polidoro, Italian painter: b. Caravaggio, 1495; d. 1543. His real name was CALDARA, but he was surnamed CARAVAGGIO from his birthplace. He went to Rome in his youth and carried bricks at first for the masons who worked in the Vatican. He first felt a great desire to become a painter from seeing Giovanni da Udine and the other painters who were occupied in the Vatican. He formed a close friendship with Maturin of Florence, who assisted him with his advice. Caldara soon surpassed him, and exerted himself to introduce improvements in drawing, having always in view the antiques. Raphael employed him in the galleries of the Vatican, where he painted,

under his direction, several excellent friezes. At Messina he executed an oil-painting, representing Christ bearing the cross, which contains a number of beautiful figures, and proves his ability to treat the most elevated subjects. He has approached more than any one to the style and the manner of the ancients, particularly in imitating their bas-reliefs. His figures are correct, well distributed and arranged; the positions are natural, the heads full of expression and character. It is evident that he would have acquired great celebrity if he had undertaken greater works. He applied himself to the *chiaroscuro,* particularly to that kind of it which is called *sgraffiato.* He showed, also, much talent in his landscapes. At the sack of Rome in 1527 he fled to Naples, and on his return from that place to Rome, in 1543, he was murdered by his domestic.

Caravaggio, Italy, a town and commune in Lombardy, 24 miles east of Milan, on the Gera d'Adda. It is celebrated as the birthplace of the two great painters, Polidoro Caldara and Michelangelo Amerighi, both called *da Caravaggio.* It was formerly surrounded by walls and defended by a strong castle. Its principal church has some good paintings. The commune is famous for its melons. Pop. about 10,000.

Car'avan, or **Karavan,** a Persian word, used to denote large companies which travel together in Asia and Africa for the sake of security from robbers, having in view, principally, trade or pilgrimages. Such a company often have more than 1,000 camels to carry their baggage and their goods. These walk in single file, and the line is often four or five miles long. To avoid the excessive heat, they travel mostly early in the morning. As every Mohammedan is supposed to visit the tomb of Mohammed once at least during his life, caravans of pilgrims go to Mecca every year from various places of meeting. Of the various caravans which proceed to Mecca every year, the most important has always been the Syrian. The place at which it meets is Damascus, and here the pilgrims and merchants assemble many weeks before the day of departure, which is always fixed according to the season of the year in which the feast of Bairam occurs, the pilgrims requiring to be at Mecca on the day of the feast. As these caravans serve mercantile as well as religious purposes, Mecca, on the arrival of the caravans, resembles a great fair, and this fair is indeed the most important in all the East. The journey from Damascus to Mecca and back occupies about four months. The leader of such a caravan to Mecca, who carries with him some cannon for protection, is called *Emir-el-Hadj* (Prince of the Pilgrims). Trading caravans choose one of their own number for a leader, whom they call Caravan Bashi. Much information on the subject of caravans is to be found in the travels of Niebuhr, who made many journeys with them, and describes them, as it is well known, minutely and faithfully.

Caravansari, kă-ra-văn'sa-rĭ, in the East, a sort of inn, situated in countries where there are no cities or villages for a considerable extent, to furnish travelers with a shelter. Some of them are built with much splendor, though they are generally unfurnished, and the traveler is obliged to bring with him not only his bed and carpet, but also all his provisions and necessaries. In many, the hospitality is gratuitous. It is common for a pious Mohammedan to establish, during his life or by will, one or several of such caravansaries. This kind of benevolence is considered peculiarly agreeable to the deity, and promotive of the eternal happiness of the founder. Sometimes persons are kept in these establishments to guide the caravans for some distance. See KHAN.

Car'avel, formerly the name of different kinds of vessels; one used in Portugal of 100 to 150 tons burden, another a French fishing vessel used on the coasts of Normandy and Picardy of 10 to 15 tons, and a third a large Turkish ship of war.

Carawala, kä-ra-wä'la, a large viper (*Hypnale nepa*) of Ceylon and southern India, numerous, and greatly dreaded by the natives, especially those who work in the pineapple plantations. Its poison has the peculiarity of not affecting the system until several days after the bite, so that proper remedies immediately applied will counteract the venom.

Car'away, an umbelliferous biennial plant (*Carum carui*), with a tapering fleshy root, a striated furrowed stem, and white or pinkish flowers. It produces a well-known seed used in confectionery, and from which both a carminative oil is extracted and a spirit cordial distilled. The two species found in America are the descendants of naturalized European plants, that have escaped from cultivation. It is largely grown in England, on strong and rich clays, and is sometimes sown with beans, but more usually with coriander and teazel, or coriander alone. After the coriander, which is only a preparatory crop, has been removed, the plants of the caraway are singled out and repeatedly hoed and cleaned. It is cut about the beginning of July, and produces on an average about 900 pounds per acre. It is a favorite crop with the Dutch. The volatile oils in caraway render it of much service in medicine. The action of these oils is to stimulate peristalsis and thus overcome flatulency. They are further antiseptic and check excessive intestinal putrefaction. They act also as mild local anæsthetics and are useful in nausea and vomiting.

Carayon, Auguste, ô-güst kä-rā-yŏń, French historian: b. Saumur, 31 March 1813; d. Poitiers, 15 May 1874. A distinguished Jesuit, he wrote: 'First Canadian Missions of the Jesuits' (1864); 'Banishment of the Jesuits from Louisiana' (1865); and similar studies.

Carbajal, Francisco, frän-thēs'kō kär-bä-häl', Spanish soldier: b. Alavaro, 1464; d. near Cuzco, 10 April 1548. He served in the army in Europe; went to Mexico in 1528; and when Pizarro appealed for help against the Inca uprising he was one of the force sent by Cortez to Peru. He was marshal under Vico de Castro, in the battle of Chuas. He later took office under Gonzalo Pizarro, in the war against Diego Centeno and De la Gasca. At first he was triumphant over Centeno in the Collao, but at the battle of Sacsahuana, 8 April 1528, he was taken prisoner with Pizarro and executed. He was extremely cruel in his treatment of his enemies, but was not less noted for his humor which never failed him, not even at his own execution.

Carballo, kär-bäl'yō, Spain, a town in the province of Corunna, situated 24 miles northwest of Santiago. It has warm mineral springs and baths. Pop. 13,500.

Carbazo'tic Acid. See PICRIC ACID.

Car'berry Hill, Scotland, a rising ground in Mid-Lothian, about seven miles southeast of Edinburgh, between Musselburgh and Ormiston, where Mary, Queen of Scots, surrendered herself to the confederate nobles of the kingdom, 15 June 1567, just before her confinement in Loch Leven Castle.

Car'bide, in chemistry, a binary compound of carbon with a metallic element, or with certain of the non-metallic elements. Of the known carbides those of iron and calcium are most important. Carbide of iron occurs in steel, and is undoubtedly concerned in some manner, with the hardening of that metal; although the authorities are not agreed as to the precise role that it plays. The best known carbide of iron is the one having the formula CFe_3; but Campbell has shown ('American Chemical Journal,' XVIII., 836) that a series of iron carbides probably exists, having the general formula C_nFe_{3n}, and corresponding in a certain sense to the hydrocarbon series C_nH_{2n}; so that when any one of the carbides of iron is treated with an acid, the corresponding hydrocarbon is set free. Calcium carbide is formed by the action of carbon upon lime at the temperature of the electric furnace. It has the formula CaC_2, and its commercial value depends mainly upon the fact that it is readily decomposed by water, with the copious liberation of acetylene gas (q.v.). Carbide of magnesium is not formed at the temperature of the electric furnace, probably because it is not stable at that temperature. It may be prepared, however, by the action of calcium carbide upon magnesium fluoride, in accordance with the equation $CaC_2 + MgF_2 = CaF_2 + MgC_2$. Like calcium carbide it is decomposed by water with evolution of acetylene gas, the yield being 50 per cent greater, per pound of the carbide, in the case of magnesium carbide. It is not unlikely that magnesium carbide will one day replace calcium carbide for the production of acetylene gas, on account of the larger yield; but this substitution cannot be made on a commercial scale until some cheaper mode of manufacture is found. The chemistry of the carbides is still in its infancy, but within the past few years, and largely owing to the splendid work of Moissan, many new bodies belonging to this class have been discovered. Gold, bismuth, lead, and tin do not form carbides at the temperature of the electric furnace, nor do they dissolve carbon at that temperature. Platinum and iridium dissolve carbon freely, but deposit it again, upon cooling, in the form of graphite. Aluminum absorbs carbon freely, with the formation of Al_4C_3, and similar results are obtained with many other metals and metallic oxides. The carbides of chromium, molybdenum, titanium, tungsten, and zirconium do not decompose water. Those of calcium, strontium, barium, and lithium decompose it with liberation of pure acetylene; but the carbides of aluminum and beryllium yield pure methane, and carbide of manganese gives a mixture of equal parts of methane and hydrogen. Other carbides decompose water with more complex results. Thus the carbides of the rare metals of the cerium group yield complicated mixtures of hydrogen, acetylene, methane, and ethylene, and the carbide of uranium gives all these products (except, perhaps, acetylene), and, in addition, copious quantities of various liquid and solid hydrocarbons. The carbides of sodium and potassium, which are best prepared by passing dry acetylene gas over the corresponding metals at a temperature of about 450° F., decompose water with liberation and acetylene. The carbides of titanium and of silicon are characterized by extreme hardness, and it is said that they will even cut the diamond with facility. Carbide of silicon is an exceedingly stable substance, and is now largely used, under the trade name of «carborundum,» as an abrasive material in the manufacture of grinding-wheels, whetstones, and polishing-cloth.

Moissan's researches with the electric furnace are reported chiefly in the 'Annales de Chimie et de Physique,' and useful reviews of them have been printed at frequent intervals in 'Nature.' Moissan claims to have been the discoverer of the crystalline carbide of calcium that is now commercially familiar; but in the United States this honor is usually accorded to Mr. Willson, whose labors were certainly quite independent of those of Moissan. See ACETYLENE; CALCIUM; CARBIDE; CARBORUNDUM.

Carbohy'drate, in chemistry, a compound consisting of carbon, hydrogen, and oxygen, and having the general formula $C_{6n}H_{2p}O_p$. As will be seen, the number of carbon atoms in a carbohydrate is always divisible by six, and the oxygen and hydrogen are present in the same proportion in which they occur in water. It is not implied, however, that the compound contains water as such, but only that the oxygen and hydrogen atoms are present in the proportion of two atoms of the latter to one of the former. It will also be observed that a carbohydrate and a hydrocarbon are two essentially different things, inasmuch as a carbohydrate contains oxygen, while a hydrocarbon is a compound containing no element but carbon and hydrogen.

The carbohydrates constitute a large and very important class of substances, embracing the starches, sugars, glucoses, and gums. Their chemical relations are intricate, and are far from being thoroughly understood. Several schemes have been proposed for their classification, but owing to the present imperfection of our knowledge none is entirely satisfactory. The classification proposed by O'Sullivan is convenient, however, and will be adopted here.

Class 1.— SACCHARANS: Amorphous substances, having the general formula $nC_6H_{10}O_5$, soluble in water but insoluble in alcohol, and further characterized by the fact that when they are treated with acids they yield substances of the type $nC_6H_{12}O_6$, directly, and without the formation of intermediate compounds. Dextran, lævulan, the amylans and the galactans are examples. (These bodies are gums.)

Class 2.— SACCHARENS: Substances possessing a certain amount of structure, having the general formula $nC_6H_{10}O_5$, insoluble in either water or alcohol, and transformed by the action of acids and certain ferments first into $nC_{12}H_{22}O_{11}$, and finally, by the action of acids, into $nC_6H_{12}O_6$. Cellulose, starch, inulin, and tunicin are examples; the first two

falling under "amylose" in the less elaborate classification which divides the carbohydrates merely into amylose, saccharose, and glucose.

Class 3.— SACCHARINS: Amorphous substances, having the general formula $n(C_6H_{10}O_5)$, soluble in water, but insoluble in alcohol; converted by acids first into $nC_{12}H_{22}O_{11}$, and finally into $nC_6H_{12}O_6$; and by certain ferments into $nC_{12}H_{22}O_{11}$. Glycogen, dextrin, and malto-dextrin are examples.

Class 4.— SACCHAROSES (sugars).

Group (*a*).— SACCHARONS: Sweet, crystallizable bodies, soluble in water and in moderately strong alcohol, having the general formula $nC_{12}H_{22}O_{11}$, and convertible by acids and sometimes by ferments into $nC_6H_{12}O_6$. Sucrose (cane sugar), lactose (milk sugar), maltose, and raffinose are examples.

Group (*b*).— GLUCOSES: Substances crystallizing, though not so readily as the members of the preceding group; having the general formula $nC_6H_{12}O_6$; soluble in both water and alcohol; and converted by the prolonged action of acids into substances that are no longer carbohydrates. Some of these, such as dextrose, lævulose, and galactose, are fermentable by yeast; while others, such as sorbinose, are not fermentable.

Group (*c*).— Certain substances, such as inosite and scyllit, which probably belong in the aromatic series and bear no special resemblance to the other members of the carbohydrate family.

O'Sullivan has also a fifth class, including those substances which, though they may not be carbohydrates in the strict sense, are nevertheless closely allied to the carbohydrates and are easily converted into them. In this class he places the glucosides and certain of the gums, mucilages, and pectins.

The carbohydrates are exceedingly important elements in the world's food supply, and may indeed be said to be essential to the maintenance of life. They are practically all of vegetable origin, and are derived ultimately from certain simple fundamental substances that are formed in the green leaves of plants. Under the influence of sunlight the chlorophyll contained in the leaves is competent to split up the carbon dioxide of the air, retaining the carbon and setting the oxygen free. The carbon that is abstracted in this way is caused to combine with the water that the leaves contain, with the production of carbohydrates; but the identity of the carbohydrate that is first formed in this way, and which serves as the starting-point for the others, is not yet established. According to the views of Sachs the "first obvious product" is starch, the formation of which he explained by the equation

$$\underset{\text{Carbon Dioxide}}{6CO_2} + \underset{\text{Water}}{5H_2O} = \underset{\text{Starch}}{C_6H_{10}O_5} + \underset{\text{Free Oxygen}}{12O}$$

It appears more likely, however, that formic aldehyde, CH_2O, is the first product, as is indicated by the equation

$$H_2O + CO_2 = CH_2O + 2O,$$

and that the subsequent products are built up by polymerization.

Carbohydrate metabolism is one of the most important physiological processes of the animal body. The carbohydrates are the chief source of energy and heat in the body. Most of the carbohydrates are converted into maltose by the digestive processes. This, by the action of absorption and assimilation, becomes dextrose, which sugar is the only normal sugar of the circulating fluids and the tissues. The dextrose is taken up by the blood, conveyed to the liver by the portal vein and stored up in the liver cells. Some of the dextrose is also stored in muscle, and certain portions of it are utilized by the nucleoproteids of the body. The fate of the glycogen of the body is to be oxidized into carbon-dioxide and water. The steps of this process of oxidation are very much involved, but it seems certain that an oxidizing ferment, perhaps from the adrenal glands, acting in conjunction with the pancreas, is largely influential in the process. A failure to bring about sufficient oxidation of the sugar in the body causes the well-known symptom of glycosuria, one of the features of diabetes (q.v.).

Carbol'ic Acid, a substance having a formula $C_6H_5.OH$, possessing feebly acid properties, and occurring chiefly in that part of the distillate from coal-tar which passes over at temperatures between 330° F. and 375° F. Chemically, carbolic acid has the structure of an alcohol (q.v.), and is an aromatic compound derived from benzene by the substitution of the hydroxyl group, OH, for one of the typical hydrogen atoms. It is also known as phenol, phenyl hydrate, or phenyl alcohol.

Carbolic acid, in the pure state, crystallizes in white, deliquescent needles, having a strong characteristic smell slightly suggestive of tar. It melts at 106° F., and boils, under ordinary atmospheric pressure, at about 360° F. Its specific gravity is about 1.07. It dissolves in alcohol, ether, and many other organic liquids, but is only moderately soluble in water under ordinary atmospheric conditions. It readily absorbs a small quantity of water from the air, forming a hydrate which is fluid at temperatures above 63° F. If the liquid so formed is shaken with water, the greater part of the carbolic acid separates out upon standing, and the vessel is found to contain an upper layer consisting of water in which a small amount of carbolic acid is dissolved, and a lower layer of carbolic acid in which a little water is dissolved. It does not exhibit very marked acid properties, but dissolves in the alkalis with the formation of salts called phenates. It does not have a strong affinity for the alkaline bases, however, and from a strong solution of sodium phenate (for example) it may be again separated in the form of an oily liquid by the addition of another acid; the new acid appropriating the base to itself, and setting the carbolic acid free. A solution of carbolic acid, even when very weak, develops a red color when boiled with a solution of mercurous nitrate and nitrous acid. This reaction, which serves for the detection of carbolic acid, is said to be delicate enough to indicate one part of the acid in more than 100,000 parts of water.

In medicine, carbolic acid has many uses. It is highly poisonous to living matter, and is used extensively to kill bacteria. In surgery it is used an an antiseptic dressing in proportions

of from ½–2 parts of acid to 100 of water. It, or some of its derivatives or allies, is used to sterilize instruments and to disinfect wounds, rooms, and dejecta. Internally, carbolic acid is used as a bactericide, limiting excessive intestinal putrefaction. It is also an anæsthetic, and is at times of service in irritability of the stomach. When used in too concentrated a solution it is an active caustic, causing a white, painless burn. Alcohol is an excellent antidote. Taken internally in pure form in doses over two to three drops it causes poisoning with a characteristic series of symptoms. There is burning in the mouth, fauces, œsophagus, and stomach. The whitish scars of the lips and mouth are characteristic. There is great pain, with vomiting of large quantities of mucus. There is usually ringing in the ears, headache, vertigo; the urine may be suppressed, reddish or greenish; and death results with small, rapid pulse, collapse, and, may be, convulsions. Similar symptoms may develop slowly in sub-acute forms of poisoning. The urinary symptoms usually lead to the diagnosis. The treatment of the acute form of poisoning is the free use of gastric lavage, ingestion of alcohol, and the use of lime water. Symptomatic treatment and careful nursing are necessary for other symptoms.

Car'bon, a non-metallic element, existing in nature in large quantities, both in the free and combined states. It exhibits marked allotropy, at least three distinctly different forms of it being known. These are (1) amorphous carbon; (2) graphite; and (3) diamond. Amorphous carbon is formed when wood or coal or almost any vegetable matter is heated strongly, out of contact with the air, and is familiar to everybody as charcoal, coke, and lampblack. Graphite (q.v.) occurs native, and may also be artificially prepared in various ways. Diamond (q.v.), which is crystallized carbon, also occurs native in certain regions, and pure specimens that are devoid of color, or which have certain special tints, are highly esteemed as gems.

Carbon has the chemical symbol C, and an atomic weight of 12.0 if O = 16, and 11.91 if H = 1. The specific gravity of diamond is 3.51, that of graphite is from 2.11 to 2.26, and that of hard gas-coke is about 2.35. The linear coefficient of expansion of diamond (Fahrenheit scale) is 0.00000066 at ordinary temperatures, and that of graphite is 0.0000044. Graphite has an electrical conductivity of about one twelfth, and hard gas-coke about one one-hundredth, when the corresponding conductivity of mercury is taken as the unit. Diamond is practically a non-conductor. The specific heats of diamond and graphite are quite different at ordinary temperatures. Thus at 50° F. diamond has a specific heat of 0.113, graphite 0.160, and wood charcoal about 0.165. These values increase as the temperature rises, and at about 1,100° F. all three varieties have a common specific heat of about 0.44. Diamond occurs in regular octahedra and in forms derived therefrom, the faces of the crystals usually being more or less curved, and often marked with little pits. Graphite forms crystals that are commonly hexagonal or rhombohedral. Graphite was long believed to be a kind of lead, and is still popularly known as "black-lead."

Carbon is infusible, and insoluble in any known liquid at ordinary temperatures. It dissolves to a limited extent in melted cast iron, and in melted platinum it dissolves freely, separating out again in the form of graphite upon cooling. It is unaltered by the action of acids, except when some powerful oxidizing agent like chlorate of potassium or bichromate of potassium is also present. Chemically it is tetravalent in nearly all of its compounds. It combines with oxygen in two different proportions, with the formation of a monoxide CO, and a dioxide CO_2. It also forms, with hydrogen, a great number of compounds known as hydrocarbons (q.v.); and it combines with many of the metals to form carbides (q.v.). With hydrogen, oxygen, nitrogen, and small quantities of other elements, it constitutes the entire substance of animals and plants; and the coal beds that make our modern civilization possible are composed of vegetable remains from which the elements other than carbon have been mostly expelled by the combined action of heat and pressure.

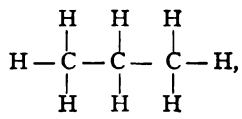
For further information concerning carbon, see AROMATIC COMPOUNDS; CARBON COMPOUNDS; CHARCOAL; COAL; DIAMOND; FATTY COMPOUNDS; GRAPHITE.

Carbon Compounds, in chemistry those compounds which contain the element carbon; and since carbon is an essential constituent of nearly all organic substances, the chemistry of its compounds is practically synonymous with "organic chemistry." Until within the past half-century it was thought by many authorities that the compounds that occur in animals and plants are essentially different in nature from those that are produced in the laboratory, and that they cannot be obtained without the action of the "vital principle." This idea received its first blow in 1828, when Wöhler prepared urea from substances that had been previously considered to be inorganic; yet as late as 1849 the great chemist, Berzelius, defined organic chemistry as "the chemistry of compounds formed under the influence of life." A vast number of substances that were formerly classed as organic have now been prepared in the laboratory, and the old classification of chemistry into organic and inorganic branches has broken down, the organic division being now more commonly and correctly called the "chemistry of carbon compounds."

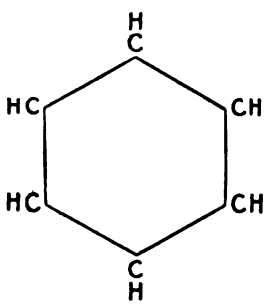
The carbon compounds form a group of great complexity, and are apparently unlimited in number. The reasons for this are that carbon is quadrivalent; that it forms multitudes of compounds with hydrogen alone, in many of which more or less of the hydrogen can be replaced by other elements, with the formation of new and altogether different substances; that its chemical bonds are apparently powerful; and that it unites with elements of the most widely different nature.

In a general way, the better-known carbon compounds are mostly divided into two great classes, according to the type of the "graphical" or "structural" formula that must be used in order adequately to represent their chemical relations. The first class includes all those bodies whose structural formulæ are distinguished by the fact that the atoms (or radicals) that are present form "open" chains, which do not any-

where return into one another. The hydrocarbon "propane," which has the structural formula



is an illustration of this class. The "open chain" compounds are called fatty compounds, and are treated under that heading. The name was originally given because many of the substances that are included in the class have long been known in connection with fats and allied bodies; but it would be more logical to call them "methane derivatives," since they may be considered to be obtainable from the hydrocarbon methane, CH_4, by a process of substitution.



The second great class of carbon compounds is distinguished by the fact that the structural formulæ that are required in order to exhibit the chemical properties of its members return into themselves, so as to form "closed" chains or rings, which (at least in the fundamental forms) contain six carbon atoms. Benzene is a familiar example. From the fact that many of the first known representatives were balsams, oils, and resins, these substances are known collectively as aromatic compounds, and are described under that heading. A better name would be "benzene derivatives," since all the members of the class are derivable from benzene by substitution.

In addition to the aromatic and fatty compounds, others are known which do not properly come under either heading. Thus the structural formula of furfuran contains a closed ring, formed by the union of four atoms of carbon and one of oxygen. Closed rings, consisting of three, four, and five atoms of carbon, are also known. The pronounced analogies and affinities that exist among the members of the aromatic and fatty groups, respectively, have forced those two groups upon the attention of chemists. Those compounds of carbon which are not strictly included within either have not yet been classified upon a similarly broad basis.

The principal phenomena of the carbon compounds are given under special headings. In addition to those already given, see, particularly, ISOMERISM; and RADICAL.

For an excellent presentation of the whole subject, see Hjelt, 'Principles of General Organic Chemistry.'

Carbon Dioxide, Carbonic Acid Gas, or Carbonic Anhydride, CO_2, is formed whenever carbon is burned in the presence of excess of oxygen or air. It is a colorless, odorless gas, soluble to a considerable extent in cold water, especially when subjected to pressure. Its solution possesses feebly acid properties, and has a peculiarly pungent taste, on account of which the aqueous solution of the acid is greatly used as a constituent of various beverages. The effervescence accompanying the opening of a bottle of beer, soda-water, or champagne, is due to the escape of the carbon dioxide that was previously held in solution. Carbon dioxide occurs in great abundance in nature, both free and in combination with various elements, in the form of carbonates. Carbonate of lime, $CaCO_3$, is one of the most common carbonates. It is formed when the gas is allowed to bubble up through a solution of lime water, and exists in nature in vast masses, as limestone and marble. (Other carbonates are described under the metals that constitute their bases.) Carbon dioxide is a constant constituent of the atmosphere (see AIR), occurring even at the tops of mountains and in the air collected from balloons. It is generated by the combustion of fuel, by respiration, by fermentation, and by the decay of animal and vegetable matter. In some localities, too, immense quantities of the gas are emitted from the ground, or from mineral springs and wells, as in the Grotto del Cane, the Cave of Montjoly in Auvergne, in the valley of Wehr, in the Eifel, and at many other places. It is being simultaneously abstracted from the air by plants, which in the sunlight decompose the gas, fixing the carbon that it contains, and setting the oxygen free. Carbon dioxide has but feeble affinity for the bases with which it combines, and is readily replaced by almost any other acid. In preparing the gas for experimental purposes the usual method is to add a dilute mineral acid to pulverized marble or other carbonate, the carbon dioxide then being liberated continuously and in large quantities. The gas is about 1.53 times as heavy as an equal bulk of air. Its critical temperature is about 90° F., and at any temperature lower than this it can be reduced to a liquid by the application of pressure.

Poisoning by this gas frequently results in closed rooms crowded with people. The symptoms may be very slight, consisting of a mild indisposition, or they may be severe — headache, nausea, vomiting, etc. In poisoning in the severer grades there is cyanosis, coma, and unconsciousness. Carbon dioxide alone is not a fatal poison; it is rendered so usually by the diminution of oxygen supply.

Carbon Disulphide, CS_2, a liquid formed when the vapor of sulphur is passed over red-hot charcoal. Under normal conditions it is a very volatile, inflammable liquid, having a specific gravity of 1.29, and boiling at 115° F. The commercial disulphide has an exceedingly disagreeable smell, but this is due to the presence of impurities. The pure liquid has a pleasant, ethereal smell. Carbon disulphide (or bisulphide) does not mix with water, but it dissolves sulphur, phosphorus, caoutchouc, and many other organic bodies that are difficultly soluble in other menstrua, and it is to this property that it owes its commercial value.

Poisoning by carbon disulphide is becoming very prevalent since the use of rubber goods has become so extensive. The symptoms of acute poisoning are due to a poisoning of the blood and a central paralysive action on the nervous system. The blood action is that of a breaking up of the red blood cells, hemolysis. This results in cyanosis, pains, headache, coma, vertigo, nausea, vomiting, weakness, unconsciousness, coma, and death. Such symptoms

are rare, the poisoning developing as a rule much less rapidly. In workers in rubber factories, in which there is much vapor of CS_2, there develop disturbances of temper, pressure feelings on the head, heat, and the feeling as if the blood would burst through the skull, with headache. There may also be symptoms of irritation of the bronchi, coughing, and roughness of the voice, etc. Treatment is fresh air and symptomatic.

Carbon Monoxide, or **Carbonic Oxide,** CO, is produced, in addition to the dioxide, when carbon is burned with a limited supply of air or oxygen. It is also generated by passing carbon dioxide through a red-hot bed of carbon, in accordance with the equation $CO_2 + C = 2CO$. For experimental purposes the gas may be generated by decomposing oxalic acid by heating it with strong sulphuric acid, and passing the gases that are evolved through a solution of caustic soda to absorb the carbon dioxide that is present. Carbon monoxide is colorless, and has a density about 0.97 times that of air. It burns with a lambent, blue flame that is often seen in coal fires that have been freshly supplied with fuel.

Carbon Oxychloride. See PHOSGENE.

Carbonado, or **Carbon,** a massive, black or dark-gray variety of diamond, also called "black diamond." Though possessing the adamantine or resinous luster of the crystallized variety, it is opaque and, therefore, of no value as a gem. It is the hardest substance known and this fact makes it the most desirable for use in diamond drills; it therefore sells for as high a price per carat as one carat rough gem diamonds (q.v.). Being without cleavage it is less brittle than the crystals, and owing to its somewhat porous structure, its specific gravity is less, 3.15 to 3.29. The commercial supply comes exclusively from the province of Bahia, Brazil, where it occurs in angular fragments which occasionally show a rough cubic outline.

Carbonari, kär-bō-nä'rē (colliers, or more strictly, charcoal-burners), the name of a large political secret society in Italy. According to Botta's 'Storia d'Italia' the Republicans fled, under the reign of Joachim (Murat), to the recesses of the Abruzzi, inspired with an equal hatred of the French and of Ferdinand. They formed a secret confederacy, and called themselves carbonari. Their chief, Capobianco, possessed great talents as an orator. Their war-cry was "Revenge for the lamb mangled by the wolf!" When Murat ascended the throne of Naples he employed Maghella, a Genoese, in the department of police, and afterward as minister. All his efforts were directed to the union and independence of Italy, and for this purpose he made use of the society of the Carbonari. The ritual of the Carbonari was taken from the trade of the charcoal burner. Clearing the wood of wolves (opposition to tyranny) was the symbolic expression of their aim. By this they are said to have meant at first only deliverance from foreign dominion; but in later times democratic and anti-monarchical principles sprang up. They called one another good cousins. No general union of the order under a common head seems to have been effected. The separate societies in the small towns entered into a connection with each other, but this union extended no farther than the province. The place of assembly was called the hut (*barraca*); the surrounding neighborhood was called the wood; the meeting itself was distinguished as the sale (*vendita*). The confederation of all the huts of the province was called the republic, generally bearing the ancient name of the province. The chief huts (alta vendita) at Naples and at Salerno endeavored to effect a general union of the order, at least for the kingdom; but the attempt appears to have been unsuccessful. The order, soon after its foundation, contained from 24,000 to 30,000 members, and increased so rapidly, that it spread through all Italy. In 1820, in the month of March alone, about 650,000 new members are said to have been admitted; whole cities joined it. The clergy and the military, in particular, seem to have thronged for admission. The religious character of the order appears from its statutes: "Every Carbonaro has the natural and inalienable right to worship the Almighty according to the dictates of his conscience." After the suppression of the Neapolitan and Piedmontese revolution in 1821, the Carbonari throughout Italy were declared guilty of high treason, and punished by the laws. Meantime societies of a similar kind had been formed in France, with which the Italian Carbonari amalgamated, and Paris became the headquarters of Carbonarism. The organization took on more of a French character, and gradually alienated the sympathies of the Italian members, a number of whom dissolved connection with it, in order to form the party of Young Italy.

Car'bonates. See CARBON DIOXIDE.

Car'bondale, Pa., a city of Lackawanna County, situated on the Lackawanna River, 110 miles north-northwest of Philadelphia; and on the Erie, the Delaware & H., and the New York, O. & W. R.R.'s. It is the centre of an important anthracite coal-field, and the principal industry is mining. There are also machine-shops, foundries, etc. As it is in a monuntain region with fine scenery, it is also a summer resort. Pop. (1900) 13,536.

Carbonear, kär'bŏn-ēr, Newfoundland, a port of entry on the eastern side of the peninsula separating Trinity Bay from Conception Bay 25 miles in a northwesterly direction from St. John's. Pop. (1901) 3,703.

Carbonic Acid, or **Carbonic Acid Gas.** See CARBON DIOXIDE.

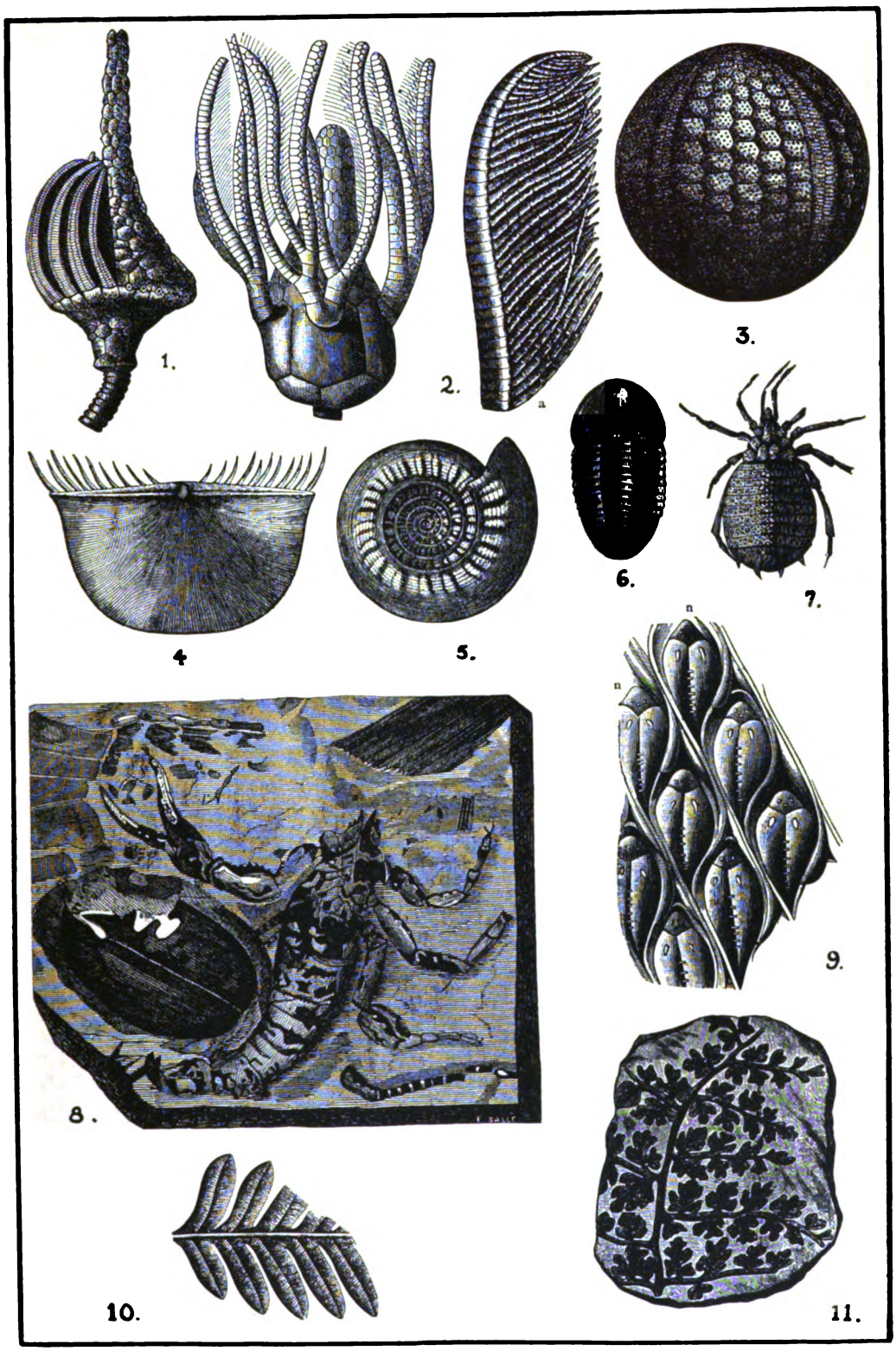
Carbonic Anhydrid. See CARBONIC DIOXIDE.

Carbonic Oxide. See CARBON MONOXIDE.

Carboniferous Limestone, or **Mountain Limestone,** certain limestones of Lower Carboniferous age, as named by Murchison and other English geologists. In the United States the silver-lead ores of Leadville and other Rocky Mountain camps, and the zinc and lead ores of southwestern Missouri, are in limestones of Carboniferous age. See CARBONIFEROUS SYSTEM.

Carboniferous Period, the last of the great time divisions of the Palæozoic Epoch. During it were laid down vast beds of plant-remains now turned to coal, whence the name. It is true that coal fields of later age than Carboniferous are known, particularly in North America, but the important coal fields of Europe and of eastern North America are of Carboniferous age. In North America, when the

FOSSILS OF THE CARBONIFEROUS, I.



1. Actinocrinus pyriformis.
2. Platycrinus trigintadactylus, a single arm with tendrils.
3. Plæchinus elegans.
4. Chonetes Dalmanni.
5. Goniates Jossæ.
6. Phillipsia.
7. Eophrynus Prestwichi.
8. Cyclophthalamus Bucklandi; beside it is the wing-sheath of a beetle.
9. Lepidodendron dichotomum, showing the stigmata of the leaves.
10. Aletopteris Serli.
11. Sphenopteris obtusiloba.

M76U

1. The Tooth-Fern — Odontopteris.
2. The Scale Tree — Lepidodendron.
3. Cordaites Borassifolia.
4. Pecopteris Cyathea.
5. Calamites.
6. Sigillaria.
7. Rhizome of Sigillaria in Water.
8. Foliation of Aunularia.

MqoU

Carboniferous Period began, most of New England, eastern Canada, and Newfoundland was land, though two long, narrow arms of the Gulf of St. Lawrence extended to Narragansett Bay. West of the Blue Ridge Mountains, or Appalachian uplift, was a great interior sea, in places quite deep and extending to the Rocky Mountains. During Carboniferous time, by a gradual uplift, the northeastern part of this sea was divided into two bays, one covering nearly all of Pennsylvania, West Virginia, eastern Ohio, and Kentucky, the other covering southern Michigan. In the west the old land surfaces sank, and great areas along the whole Rocky Mountain region and beyond were covered by the sea. In general, the Carboniferous in North America was a period of slow changes of land surface with no volcanic outbursts. In the eastern part of the continent the land sank, then gently rose, over great areas, forming vast swamps, with numerous oscillations following. The sea covered most of the land west of the Mississippi. In Europe a clear sea stretched from inland to central Germany at the beginning of Carboniferous time, but later this area was a series of swamps. In Russia the land, after several changes of level, sank, and a great area, comprising southern Europe and Asia and part of northern Africa, was covered by the sea.

The plant-life of the Carboniferous Period — entirely gymnosperms and angiosperms — showed some advances from the Devonian. The ferns were most abundant, some being like tall trees, others as small as the maidenhair fern of to-day. The most conspicuous growths in the Carboniferous forests were the Lycopods or club-mosses, now represented by insignificant forms, but then growing sometimes 75 feet or more high, with trunks three feet in diameter, and spreading branches (*Lepidodendron*). Other Lycopods (*Sigillaria*) had short, thick trunks with few if any branches. Still another group of cryptogams, the *Equisetæ* or horse-tail rushes, were of far greater importance in Carboniferous time than now. Of these the *calamites,* with their tall, slender stems, must have been one of the commonest plant forms of the Carboniferous forest. No plants with conspicuous flowers existed, the flowering plants being gymnosperms of which one of the commonest was *Cordaites.* The Carboniferous forests were probably gloomy and featureless. The singularity of the flora over the whole world from Siam to Spitzbergen indicates a uniform climate without temperature zones.

Of animal life, corals, especially the genus *Lithostrotion,* were abundant; and the *Foraminifera,* especially the genus *Fusulina,* became of importance. Of the echinoderms the extinct blastoids, particularly the genus *Pentremites,* were abundant, and the Carboniferous is the period in which the crinoids, or sea-lilies, reached their highest development. Sea-urchins (echinoids) were more plentiful than in the Devonian, but the trilobites were slowly dying out. Of the land arthropods, scorpions were fairly abundant, and the first true spiders appeared. The brachiopods were less abundant than in the Devonian, the genus *Productus* being of most importance. Bivalve mollusks were numerous, among them being the first land shell. Of the fishes, the sharks, notably the orders *Pleuracanthus* and *Acanthodes,* were remarkably developed. Amphibians, which probably existed in Devonian, increased greatly in Carboniferous time, but belonged to an order now extinct, *Stegocephala,* and were of small or moderate size, no species being over eight feet long.

Carboniferous System. As the rocks laid down in Carboniferous time furnish by far the greater part of the world's supply of coal, they have been very carefully studied in many different places and accurately mapped, so that more is known of the Carboniferous rocks than those of any other Palæozoic system. By American geologists the rocks are divided into two series, an upper and a lower, which differ greatly in Nova Scotia, the Appalachian States, the Mississippi valley, and the Rocky Mountain States.

The Lower Carboniferous series, in what is called the Acadian province, Nova Scotia, and New Brunswick, is made up of thick beds of sandstone and limestone overlaid by limestones containing masses of gypsum. The total thickness of the series is 6,000 feet. In Pennsylvania the Lower Carboniferous series is divided into the Pocono sandstone and the Mauch Chunk shales, with a total maximum thickness of 4,000 feet. Westward there are in Ohio the Waverly beds, shales with some limestone, and in Michigan the marshall beds, sandstone and gritty shales, with limestone and gypsum above. Farther west the Lower Carboniferous is represented by the Mississippian series, including the Kinderhook, Osage, St. Louis, and Chester stages, all limestones, with a maximum thickness of over 1,200 feet in southern Illinois. These limestones underlie the eastern and western interior coal fields (see COAL). In southwestern Virginia are limestones, sandstones, and shales of Lower Carboniferous age, 2,000 feet thick, and containing a few workable beds of coal. In the Rocky Mountains the Lower Carboniferous rocks are, with few exceptions, limestones.

The rocks of the Upper Carboniferous include the great coal fields of eastern North America. (For the origin of coal fields, see COAL.) The rocks of the coal measures are sandstones or conglomerates, grits, shales, clays, limestones, and seams of coal. A coal seam is usually underlaid by a bed of fire-clay, representing an old soil, and overlaid by shale. The total thickness of the Nova Scotia coal measures is 7,000 feet, and 76 distinct seams of coal are known. In Pennsylvania the coal measures have been separated into the millstone grit, lower productive, lower barren, and upper productive stages, and have a total thickness of 4,000 feet. In Michigan the coal measures are about 300 feet thick; in the eastern interior (Illinois-Indiana) field 600 to 1,000 feet, and in the western interior field the thickness varies widely, reaching a maximum in Arkansas.

The Upper Carboniferous rocks cover wide areas in Utah, Colorado, and Arizona; they also occur in the Black Hills in South Dakota, and in California, and British Columbia. They are generally limestones or sandstones, and contain no coal beds. The distinction between Upper and Lower Carboniferous is not as sharp as in the Mississippi valley. The total thickness of the whole Carboniferous series in Nevada and Utah is about 13,000 feet.

In western Europe the Lower Carboniferous limestones reach from Ireland to central Germany, with a maximum thickness in England of 6,000 feet. In southeastern Germany the Lower

Carboniferous rocks are sandstones and slates, while in Russia the coal measures of Lower Carboniferous age are overlaid by a great thickness of Upper Carboniferous limestone. In Asia the Chinese coal measures are of Upper Carboniferous age, and are underlaid by Lower Carboniferous limestone. In South America the Lower Carboniferous is mostly made up of sandstones, and the Upper of limestones, with very few coal seams.

See Dana, 'Manual of Geology'; Giekie, 'Text Book of Geology'; 'Report of the United States Geological Survey' (1900–01, Part III.).

Carborun'dum, a trade name for carbide of silicon, SiC. This compound is produced by melting sand and carbon together in the electric furnace. It is characterized by extreme hardness, and is used for abrasive purposes, as a substitute for corundum and emery. It was discovered by E. S. Acheson in 1890, and is now manufactured in large quantities at Niagara Falls. The production is probably about 1,500 tons per annum.

A new and valuable use for carborundum is covering firebrick with a highly refractory coating. Since carborundum can only be melted at extremely high temperatures, the electric furnace being required for the purpose, it follows that the temperatures ordinarily generated for smelting of ores and metals are much below its fusing point. Finely powdered carborundum is made up into a paste with sodium silicate, or some similar binding substance; and the paste is applied by means of a brush, or otherwise, to the bricks which are intended to be used for building a furnace, or those bricks are actually immersed in the viscid liquid for a certain time. If the furnace has already been built, the paste can be painted on the exposed surfaces. It is stated that a layer one twelfth inch thick will protect the bricks from the attack of the highest temperature which is ever produced by combustion methods in ordinary work.

Car'boy, a large and somewhat globular glass bottle protected by an outside covering of wickerwork or other material, for carrying vitriol or other corrosive liquids.

Car Building Industry. The memory of men still living is sufficiently elastic to stretch back to the beginnings of steam railroads in this country, and to comprehend the various changes by which the modern railway has become a highly organized and elaborately equipped mechanism. We borrowed the railway from England, but developed it on our own lines. The invention of the locomotive at first simply furnished a mechanical power to transport freight in cars that had formerly been hauled by horses. Tramways were in use in the Hungarian mines during the 16th century; and Ralph Allen's English stone-car of 1734, with its flanged wheels and its hand-brake, is clearly the forerunner of the freight-cars of to-day.

The term «railway» was invented in 1775, when it was first used in Smeaton's reports on English transportation, a quarter of a century before steam was applied to locomotion. Thanks to the recent researches of Mr. Clement E. Stretton, we now know that the first persons ever conveyed by a locomotive on rails traveled, on 24 Feb. 1804, behind Trevethick's locomotive on the Pennydarran cast-iron plateway or tramroad to Merthyr-Tydvil, in Wales, a distance of nine miles. In order to transport long bars of iron and timber, the cars were made in pairs, coupled together by an iron drawbar having a joint at either end. The cars had no sides, but in the middle of each was fixed a centre-pin upon which worked a cross-beam or bolster, and upon this cross-beam the timber or bars of iron were placed. On the occasion referred to the trucks were loaded with 10 tons of iron bars, and 70 persons stood on the iron. Here we have the origin of the bogie or truck, the invention of which has been claimed for this country, as we shall see hereafter. Also the capacity of the freight-car, fixed at the beginning at 10 tons, remained at that figure for half a century or more.

In 1812 John Blenkinsop of Leeds had a private car built to carry himself and his managers to his Middleton colliery, while the workmen rode on the coal-cars. On 27 July 1814, George Stephenson's first locomotive, Blucher, drew over the Kenilworth colliery line a passenger-car made by placing the body of Lord Ravensworth's four-in-hand coach on a wooden frame fitted with flanged wheels. This car was used for 20 years. On 27 Sept. 1825, the Stockton & Darlington Railway was opened, and trains of coal-cars were run, with one passenger-coach named the Experiment. This was the first passenger-car to be run regularly for the use of the public. It was placed on four wheels, and had a door at each end, with a row of seats along either side and a long deal table in the centre. This car was operated 10 days, until the novelty was worn off; and then the faster stage-coaches carried the passengers. It was not until 15 Sept. 1830 that the Liverpool & Manchester Railway opened its line with a train carrying 600 passengers, and immediately thereafter began to run the first regular passenger-trains.

It is a striking fact in the history of car construction that the English invented both the truck and the long passenger-car with the door at each end; and that these forms, once invented, were almost immediately discarded in England, so that it was left for this country to reinvent them and to make them the distinguishing features of American car building as contrasted with English construction. Indeed, it has been with great reluctance that we have ceased to claim them as original discoveries.

The fact that passenger-trains, by displacing stages, threw out of use many of those vehicles, coupled with the other fact that the stage owners, submitting to the inevitable, often became railroad promoters, furnishes a reason why the early masters of transportation both used the stage-coach body as a matter of economy, and also built their new cars on the model in which the conveniences of travel had been most highly developed. The first passenger-coach used in Pennsylvania in 1832 was a stage-coach slightly enlarged. To be sure, the early prints show that in 1830 Peter Cooper's first locomotive hauled an open boat-shaped car from Baltimore to Ellicott's Mills, on the Baltimore & Ohio Railroad; but this model must have been adopted for economy's sake, because in 1833 that railroad placed in service the Ohio, a car, stage-coach in shape, with seats on top as well as inside.

As President Mendes Cohen well observed in his address before the American Society of

Civil Engineers in 1892, the first important modifications in car building were called forth by the speed developed in the locomotive. Naturally the wheels first demanded attention. The names of four men are connected with early wheel improvement. Mr. Knight improved the shape of the tread and flange; John Edgar and Ross Winans developed the chilled features; and Phineas Davis further improved and perfected the wheel by altering the disposition of the metal in the tread and the angle of the flange, and by introducing within the cast-iron wheel a wrought-iron ring of five eighths or three quarters of an inch round iron, both perfected the chill and added strength to the wheel. Mr. Winans' shops turned out thousands of these wheels for use not only in this country, but also in Germany and Switzerland. From 30,000 to 50,000 miles represented the capabilities of a Winans wheel.

With increased speed came the need for increased steadiness, and it occurred to Ross Winans that by adopting the device of the bogie, or swiveling truck used in the transportation of freight, he could build an easy-riding passenger-car. In 1833 Mr. Winans constructed three long houses on wheels, each capable of seating 60 passengers. Having patented his invention, he was confronted by the fact that the principle he had used was one that had been utilized frequently on tramways, and particularly on the famous Quincy granite railroad, built to transport stone for the Bunker Hill Monument. At the end of protracted litigation the courts annulled the patent.

We now know that prior to 1830 England had three bogie-engines at work; that in 1831 Stephenson's John Bull, built for the Camden & Amboy road, was made into a bogie after it reached this country — a fact made patent by the famous run of that engine from New York to Chicago in 1893; that Horatio Allen used a bogie-engine on the South Carolina Railroad in 1832, the same year in which the bogie-locomotive Experiment was built for the Mohawk & Hudson Railroad. Moreover, the bogie principle was patented in England in 1812. Yet, whatever may be the legal aspects of the case, it is certain that the American passenger-car of to-day originated with the three passenger-coaches built in Ross Winans' shops in 1833. England discarded the bogie principle for engines in 1830, and did not return to it until 1876; and that country to this day has not adopted the bogie for passenger- or freight-cars. In 1889, the Paris, Lyons & Mediterranean Railway adopted the bogie for certain passenger-cars; and in 1895 the Great Western Railway of England began to experiment with the bogie-truck. In America the Winans passenger-coach almost immediately supplanted everywhere the stage-coach form, which England still retains in a modified shape, excepting only on the Pullman cars, introduced into that country in 1874. With us not only the passenger-cars, but the baggage, mail, and freight-cars, all were placed on swiveling trucks.

That the early railroads of this country were designed to carry passengers rather than freight is to be seen by their reports. The Baltimore & Ohio road, from 1 Jan. 1831, to 1 October carried over its 13 miles of track 5,931 tons of freight and 81,905 passengers; and so late as 1839 the Camden & Amboy carried only 13,520 tons of merchandise as against 181,479 passengers. In fact, the railways as freight carriers could not compete with the canals, which in those days were the traffic routes. In 1831 the Tuscarora & Port Carbon Railroad could not meet canal rates by 39¼ cents per ton, the railway charges being 40 cents, plus a toll of 15 cents per ton, while the canal rates were 10¾ cents, plus 5 cents toll.

Mr. John Kirby, describing from memory the freight-car of 1848, says that it was the same square box it is to-day; its capacity was from six to ten tons; the roof was covered with cotton duck painted and sanded. The hot sun cracked this covering and let the water in on the freight, an annoyance common also to passenger-coaches of that day. Few freight-cars were used in New York State at that date, the Erie Canal being sufficient for summer freight. Wood was the universal fuel, so there was no coal transportation. Wooden brake-heads were used, and it required three men to turn the screw that pressed the wheels on and off the axles. The ripping of planks was done by hand, as was also the dressing up; and when one man had tools to grind, a fellow-workman turned the stone. Carpenters and car builders of six years' experience commanded $1.12½ a day wages.

Viewed from the standpoint of to-day, the passenger-car of the early 'fifties, built at a cost of about $2,000, was a combination of inconveniences. The cast-iron stove in the centre of the car broiled those who sat immediately around it, while the unfortunates one seat removed from its satanic glare shivered and froze. In summer the dust was intolerable, and, notwithstanding elaborate devices for ventilation, the dust problem did not begin to be solved before the appearance of the monitor roof in 1860. Hot-water heating and the abolition of the deadly car-stove came with the Pullmans.

In 1856 Captain (now Sir) Douglas Galton, of the Royal Engineers, was sent to America to investigate our railways. His report to the lords of the Privy Council for Trade gives a straightforward and unbiased account of his investigations. Perhaps there is extant no other report which so comprehensively discusses the railway situation in the United States about that date.

"The practice of constructing railways [in America] in a hasty and imperfect manner," says Capt. Galton, "has led to the adoption of a form of rolling stock capable of adapting itself to the inequalities of the road; it is also constructed on the principle of diminishing the useless weight carried in a train. The principle is that the body of the car is carried on two four-wheeled trucks, to which the body is attached by means of a pintle in the centre, the weight resting on small rollers at each side. The framing of the truck is supported on springs resting on the axles, and the pintle and rollers are fixed to a cross-beam, which is attached by springs to the main framing; so that between the body of the car and the axles are a double set of springs. India-rubber springs are in general use, but they often become hard; consequently sometimes steel springs are used, with great advantage. Any side movement which might result from the slight play allowed to the cross-beam is counteracted by springs placed between its ends and the framing. An iron hoop attached to the framing passes under

the axle on each side, so as to support the axle in case it should break."

The bearings Capt. Galton found not unlike those used in England, but the use of oil as a lubricator was novel. He was told that under favorable circumstances the oil in an axle-box needed to be renewed but once a month; but that it was difficult to obtain good oil. The wheels were of cast-iron, with chilled tires; they were from 30 to 36 inches in diameter, weighed rather more than 500 pounds, and were without spokes. When made by the best makers they would run from 60,000 to 80,000 miles before the tires were worn, and they cost from $14.50 to $17.00 each. The iron used in making wheels was of very superior quality; and so great was the practical skill required that but three firms in the United States could be relied on to furnish wheels of the first grade.

The most approved form of draw-bar was continuous under the car, and was attached to the elliptic springs, acting in both directions. The iron shackle was in general use, but some railways preferred an oak shackle 18 inches long, two inches thick, and six inches broad. This block was bound with an iron band divided on each side at the centre, so that a car on leaving the rails would break the shackle transversely.

Already the automatic coupler for freight-cars was prefigured in a device by which the pin in the bumper of one of the cars was supported by means of a ball, so that the shackle of the on-coming car pushed back this ball and let the pin fall into its place. All passenger-cars and most freight-cars were supplied with brakes; and the Philadelphia & Reading Railroad was endeavoring to anticipate the day of train-brakes by an invention whereby a sudden check in the speed of the engine applied the brakes to the wheels of all the cars. The saloon, the car-stove, and the ice-water tank all had established themselves in the best cars, and were novelties to the visiting Englishman.

On the Illinois Central, between Cairo and Dubuque, some of the cars were filled with compartments in which the backs of seats turned up and so formed two tiers of berths or sofas, for the accommodation of persons who might wish to lie down and were willing to pay for the privilege. The passenger-car had attained a length of 60 feet, though the 30- and 45-foot cars were more common; the baggage-cars, with their compartments for mail and express, were 30 feet long, and the freight-cars from 28 to 30 feet. In those days the freight-cars were constructed more strongly than were the passenger-coaches; a Baltimore & Ohio freight-car 28 feet long, and with a capacity of nine tons, itself weighed six tons.

In summing up the result of his observations as to the rolling stock in this country, Capt. Galton notes that the Americans appear to have taken their ideas more from a ship than from an ordinary carriage, and to have adopted the form best calculated to accommodate large masses, with a minimum of outlay for first cost; and that while the cars had been designed with a view to avoid every appearance of privilege or exclusiveness, or of superiority of one traveler over another, they had been constructed so as to secure to every traveler substantial comfort and even privacy.

"There is but one class," he said; "but as the cars are designed with more regard to comfort than English railway carriages, this class is much superior to our second and third classes, and is inferior only to the best first-class English carriages. Notwithstanding the superior comfort of the American railways, the rates of fare averaged lower than the second- and sometimes even the third-class fares in England."

Of necessity progress in car-building had to wait for the development of the railroads. The original roads were not constructed as through lines between the larger cities, but as the connecting-links between natural waterways, answering to the portages or carrying places of the old days when commerce was conducted in canoes. Often built as the result of local or State enterprise, a short line was sufficient to use up the scanty capital available, or to exhaust the willingness of the people to be taxed for public improvements. The great systems of to-day represent survivals of the fittest early ventures, and development according to environment. Thus the various small roads which traversed the present main line of the New York Central were not consolidated until 1853, and the same year the roads between Philadelphia and Pittsburg came under one control. So late as 1862 there were five separate companies operating the lines between Lake Erie and Lake Michigan; and as each road had a gauge of its own, it was regarded as a triumph in car construction when freight-cars of compromise gauge were built to run over all five roads. In 1869, however, the Lake Shore & Michigan Southern lines came under a single head.

When, in October 1865, a combination was formed among eight railroads to establish a fast freight line between New York and Boston and Chicago, the maximum difference in the gauges of the several lines was one inch; and this was compensated for by a broad tread wheel. Each company contributed a number of cars proportionate to its mileage, one car for every three (afterward increased to one for every two) miles. In 1865 the quota of the Lake Shore & Northern Indiana was 179 cars; while in 1894 that road's quota of Red Line cars was 2,200.

In 1862 the United States government conducted the greatest railroad business known up to that time. With headquarters at Nashville, the government operated 1,500 miles of road with 18,000 men, whose monthly wages amounted to $2,200,000. The rolling stock consisted of 271 engines and 3,000 cars. No entirely new locomotives were built, but the 3,000 men employed in the locomotive repair shops pieced out fully equipped engines founded on a serviceable boiler or a pair of sound driving-wheels. Among the triumphs of the national car-shops were, first, a headquarters car for Gen. Thomas, the car being 50 feet long, iron-plated, and provided with a kitchen, a dining-room, a sleeping apartment, and an office; and, secondly, the hospital-trains, in which the jars and jolts were reduced to a minimum. It was during the year 1864 that Gen. McCallum and Col. Wyman came to Detroit and summoned the managers of the Michigan Car Company to stop all building then in progress and to work solely for the government. They gave a contract for a number of box- and flat-cars to be operated

on southern roads; and inasmuch as the gauge differed from that of the northern roads, the new cars were loaded on flat-cars and sent to Cincinnati. The government officials fixed the price of the cars and made payment in certificates, some of which the company exchanged for materials, and the remainder were held until money could be obtained for them.

The enormous transportation business developed by the war, together with the labor conditions and the paper-money issues, combined to raise the price of cars; so that the standard freight-car of 1864, a car 28 feet long and with a capacity of 10 tons, cost $1,000 or more. About 30 years later a car 34 feet long, with a capacity of 30 tons, and provided with automatic couplers, air-brakes, and other improvements, could be purchased for about $500.

When the war ended the managers of railways were called on to face a heavy decline in both freight and passenger traffic, due to the disbanding of the armies. Money was not plentiful, cars were very expensive, and the mania for extending lines into new territory had begun. Under these conditions the roads began a system of borrowing cars from the builders or from car-trust companies. The Michigan Car Company was probably the first to make contracts on a car-loaning basis; be that as it may, this company had at one time loaned to railroads between 6,000 and 7,000 cars, payment being made according to the car's mileage. With better times and better credit the roads began to buy cars for cash or on long time, as was most convenient; and loaning freight-cars to railroads on a mileage basis was practically discontinued. A majority of the refrigerator-cars, however, continued to be owned by private parties and run on a mileage basis. The reduction in the mileage rate practically killed the business of private ownership, since the new rate did not much more than pay for the repairs.

The sleeping-car had its beginnings as early as 1838. The Baltimore *Chronicle* for 31 October of that year described one such car that had been put on the line between Baltimore and Philadelphia. The enthusiastic reporter related that the car had berths for 24 persons, and that for a small consideration the weary passenger might spend the six hours of travel between those cities as pleasantly as if he were asleep in his own bed. Nothing then seemed to be wanting except dining-cars, and those were promised for the near future — a promise, alas! not fulfilled for many a long year.

Twenty years later, in 1858, George B. Gates invested $5,000 in two sleeping-cars to run between Cleveland and Buffalo; but passengers could not be persuaded to use them. The same year the line between Toledo and Chicago was equipped with two sleeping-cars built by the Wason Company, of Springfield, Mass., and owned by Mr. Bates, of Utica, N. Y. These cars were 50 feet long, with 16 sections in summer and 14 in winter. When not in use the bedding and curtains were stored in an end section; and a single wash-basin and one saloon furnished the toilet conveniences for the 48 persons the car was expected to carry. A sofa along the side of the car formed the lower berth, the middle one was hinged to the window-casing, and the upper berth rested on cleats fastened to permanent cross-partitions. It was while traveling in one of these cars, in 1858, that Mr. George M. Pullman began to plan the sleeping-cars that have revolutionized railway travel in this country, and are making their way in Europe, where comfort is less an essential to the traveler than it is in America.

In 1859 Mr. Pullman transformed two Chicago & Alton coaches into better sleeping-cars than any others; but it was not until 1863 that the Pioneer, the first Pullman, was placed on the road. The car cost $18,000 — an astounding price in those days. It was higher and wider than most roads could admit, and it was not until President Lincoln's funeral that the roads between Chicago and Springfield narrowed their platforms and adapted their bridges so as to allow the Pioneer, carrying the funeral party, to pass over their lines. Shortly afterward Gen. Grant's trip from Detroit to Galena, Ill., in the same car, opened those lines to the Pioneer. After that time progress was rapid. The Pullman Company was organized in 1867, and its success is too well known to need comment here. From the palace sleeping-car to the parlor- and the dining-room car is a short step. But a long jump was taken in the vestibule, invented by Mr. Pullman in 1887, by which trains are made solid and the platform is robbed of the last of its terrors.

In the winter of 1868-9 the first Westinghouse air-brake was used on the Steubenvillle accommodation train running on the Pittsburg, Cincinnati & St. Louis Railroad. The Pennsylvania road adopted it, and since the automatic feature was added, in 1873, it has come into almost universal use on passenger-trains, while by far the larger proportion of new freight-cars built are equipped with it. In 1887 a train of 50 freight-cars made a triumphal tour of the great lines, and by repeated tests, under varying conditions, proved that the Westinghouse brake can stop a train in one tenth the space required by the hand-brake. In 1867 Col. Miller placed his patent platform, buffer, and coupler on three cars building in the shops at Adrian, Mich.; and with great rapidity the dangerous old platform, with its loose link coupling, disappeared. In 1860 the Post-Office Department began to demand more room from the railroad companies, and year by year the mail-cars were increased from 17 to 20 feet in length, then to 35, and finally to 60 feet.

The interchange of cars among the various roads made it necessary to adopt standards in car construction, in order to facilitate repairs to cars when away from the home road. Some authority, too, was needed to settle disputes between roads, arising from charges for repairs; to investigate new brakes and couplers; and, in general, to keep the work of construction fully abreast of the times. The Master Car Builders' Association, organized in 1867, amply fills this need; and the reports of its annual meetings contain the latest word on all subjects relating to car-building. Its arbitration committee also acts as a court of conciliation for the various roads.

Prior to the panic of 1873 all the car-works were busy. That panic caused the failure of a large number of new railroads, which, in turn, forced into bankruptcy and eventual reorganization many car companies. From 1873 to 1879 the car-shops throughout the country were practically idle; but with the revival of business in

1878–9 the car-works again became busy, and with the exception of a slight dullness in 1883–4, did a large and profitable business until 1893. The effect of business depression on car-building may easily be seen from the fact that in 1890, 103,000 freight-cars were built by 50 companies; in 1893 the output of 43 companies was only 51,216 cars; and in 1894 the 27 companies operating their plants turned out 17,029 cars. Fifteen companies that built 3,000 freight- and 300 passenger-cars in 1893 built not a single car in 1894. The increase in the total number of cars during the fiscal year 1894 was but 4,132, as against 58,854 in 1893. The rapid increase since that date may be judged from the fact that the capacity of car-building factories in the United States on 1 June 1903 was estimated as follows: Freight-cars, 270,200 per annum; passenger-cars, 2,700; street-cars (including electric and interurban), 17,850.

CAPACITY OF CAR FACTORIES FOR OUTPUT JUNE 1, 1903.

	Freight cars	Passenger cars
American Car & Foundry Co.	125,000	800
Pressed Steel Car Co.	35,000	
Southern Car & Foundry Co.	20,000	
The Portland Co.	300	
The Laconia Car Co.	1,200	50
Keith Mfg. Co.	600	
Osgood Bradley Car Co.	700	100
Wason Mfg. Co.	1,800	100
Cambria Steel Co.	4,000	
Erie Car Works	2,400	
Lehigh Car, Wheel & Axle Works	4,000	
Middletown Car Works	2,400	
Standard Steel Car Co.	18,000	
M. H. Treadwell & Co.	1,200	50
Billmeyer & Small Co.	1,200	100
Harlan & Hollingsworth Co.		200
South Baltimore Car Works	3,600	
Chattanooga Car & Foundry Co.	800	
Knoxville Foundry & Mach. Co.	700	
Georgia Car & Mfg. Co.	2,400	
Barney & Smith Car Co.	5,000	300
The Niles Car & Mfg. Co.		50
Lima Locomotive & Machine Co.	2,500	
The Jewett Car Co.		150
The Youngstown Car Mfg. Co.	2,000	
Haskell & Barker Car Co.	10,000	
Mt. Vernon Car Mfg. Co.	4,500	
The Pullman Co.	10,000	700
Western Steel Car & Foundry Co.	10,000	
California Car Works	900	100
	270,200	2,700

	Street and Electric cars
American Car & Foundry Co.	150
The Laconia Car Co.	900
Briggs Carriage Co.	300
Newburyport Car Mfg. Co.	300
Osgood Bradley Car Co.	300
Wason Mfg. Co.	500
The Graham Co.	600
J. M. Jones Sons	600
John Stephenson Co.	700
J. G. Brill Co.	3,000
Barney & Smith Car Co.	1,000
The Jewett Car Co.	700
The G. C. Kuhlman Car Co.	800
The Niles Car & Mfg. Co.	800
American Car Co.	1,000
Laclede Car Co.	1,000
St. Louis Car Co.	4,000
Woeber Carriage Co.	300
California Car Works	800
	17,850

The average life of a freight-car being from 12 to 15 years, at least 125,000 cars must be built each year to repair the ravages of time; besides the cars required to make good the losses by accidents and for the increase in mileage and business. The transportation of various kinds of products, such as live-stock, dressed meat, oil, timber, etc., has called into being cars especially adapted to each class of freight, so that scores of different kinds are now constructed to answer the demands of the shippers. Among the different makes may be named: flat or platform cars; the ordinary box-car, the gondola or coal-car, the hopper gondola coal-car, which has a gate in the bottom of the car for emptying the car without handling the contents; the hopper-car, which has a number of gates in the bottom for emptying the car rapidly; side dumping-cars, coke-cars, stock-cars especially prepared for different kinds of stock; horse express-cars, for transporting fine horses; furniture or vehicle-cars; refrigerator-cars; ventilated fruit-cars; special construction or repair-cars, and caboose-cars for trainmen. Steel-cars are used for the transportation of heavy material such as coal and ore. See STEEL CAR INDUSTRY.

Passenger-cars are divided into the ordinary passenger-car, the combination cars for baggage, mail, express and passengers, each style being of different construction; chair-cars, parlor-cars, dining-cars, combination parlor and café-cars; library- and buffet-cars; private cars containing business office, sleeping apartments, dining-room, kitchen, and observation room; and sleeping-cars. Street-cars are divided into electric, cable, horse, and parlor-cars.

According to the census of 1900 there were 65 establishments turning out steam-cars (some of which also constructed street railway cars); and 1,296 car-shops belonging to the various steam railways, and engaged in the building as well as the repairing of cars, making a total of 1,361 establishments, with a capital of $207,904,125, employing 215,567 wage-earners and salaried officials, with wages and salaries aggregating $120,798,002. The materials used cost $171,281,760 and the value of products aggregated $308,748,457.

The 1,296 establishments operated by railroad companies, reported an invested capital of $119,580,273, or 57.5 per cent of the capital of the combined industry.

The 10 states leading in the construction and repair of steam railway cars in 1900 were: Pennsylvania, with a product of $62,326,081; Illinois, with $41,426,030; New York, with $21,423,201; Indiana, $19,248,999; Ohio, $16,917,554; Michigan, $14,253,707; Missouri, $14,246,889; Texas, $8,314,691; California, $7,553,626; and Kansas, $6,816,816. The aggregate value of the products for these States $212,527,594, or 68.8 per cent of the total value for the United States. The products for the first five States aggregated $161,341,865, or 52.3 per cent of the total value.

The constantly increasing traffic in this country rapidly absorbs the product of the car-shops, but there is also a foreign demand of considerable magnitude for American-built cars. This demand changes with the varying industrial conditions and commercial activity of the countries importing these products, as well as with the economic conditions existing in this country.

In 1890 and 1891 the value of exported cars exceeded the value in 1900. During the business depression which followed there was a marked decrease in the number of cars constructed, both for foreign and domestic use. The construction of freight-cars was the first to be affected. The number of passenger-cars constructed in this

country did not decrease materially until after the Columbian Exposition in 1893. The foreign demand and the exposition were potent factors in keeping many of the shops running during 1893. A year or two later the demand for freight-cars began to increase, and since 1897 the demand for both passenger- and freight-cars for foreign and domestic use has shown a constant growth. The exports for 1900, aggregating $2,558,323, exceeded the average yearly exports from 1880 to 1890 by $1,581,872; those from 1890 to 1900 by $756,484; and the average for 20 years by $1,169,178.

Among foreign countries importing American cars for steam railroads in 1900, Mexico led, purchasing to the amount of $714,329. Egypt followed with imports aggregating $401,151. The next six countries in the order of amounts expended are: France, $280,939; Brazil, $133,378; Great Britain and Ireland, $124,585; Argentina, $105,147; British Australasia, $50,754; Cuba, $79,723. No cars or parts of cars were exported to Asia or Africa in 1890, but in 1900 these exports to Asia were valued at $33,492 and to Africa at $405,895.

W. J. McBRIDE,
Vice-President American Car & Foundry Co.

Car'buncle, a very severe form of boil (q.v.). Also the lesion of malignant pustule, or anthrax (q.v.).

Carbuncle, a general term used to describe any red garnet when cut *en cabochon*. Pliny and other early writers apparently applied the name "carbunculus" indiscriminately to ruby, ruby spinel and garnet. The best usage at the present time confines it to the almandite garnet when cut *en cabochon*, that is, with a rounded convex surface. Usually such stones are hollowed out at the back and a piece of metal foil is inserted in order to lighten the otherwise too dense red color.

Carburet. See CARBIDE.

Carcagente, kär-kä-hän'tā, or **Carcaxente,** Spain, a town in the province Valencia, and 28 miles south by west of the town of that name, in a fertile and beautiful plain, on the right bank of the Jucar. The houses are well built and spacious, forming wide and clean streets. The principal square is large, lined with handsome dwellings and shops, and contains a spacious and elegant modern townhouse and prison. There are likewise a parish church, several chapels, two convents, a hospital, almshouse, cemetery, some primary schools, and an extensive palace of the Marquis of Calzada. In the environs are delightful promenades and gardens. It has a trade in grain, fruits, silk, woolen goods, and linen. Pop. 12,000.

Carcajou, kär'ka-joo, a French-Canadian name for the wolverine (q.v.), frequently misapplied to the wildcat and puma.

Carcanet, kär'ka nĕt, a jeweled necklace or chain, an ornament referred to by Shakespeare, and by Tennyson in 'The Last Tournament.'

Carcano, Giulio, joo'lē ō kär-kä'nō, Italian poet: b. Milan, 1812; d. 1884. He wrote a narrative poem, 'Ida Della Torre,' while a student at Pavia (1834). His next work, 'Angiola Maria' (1839), had extraordinary success; it is a deeply sympathetic story of Italian family life, and is regarded as the highest type of that class in Italian. In the same vein is the volume 'Simple Narratives' (1843). He wrote also 'Damiano, the Story of a Poor Family,' and other works. See Prina, 'Giulio Carcano' (1884).

Carcar, kär'kär, Philippines, a city on the northern coast of the island of Cebu, situated on the Bay of Carcar, 23 miles from the city of Cebu. It is near the head of the bay and on the road running along the eastern coast of the island. Pop. about 30,000.

Car'cass, in military language, an iron spherical case filled with combustible materials, which is discharged from a mortar, howitzer, or gun. It does not burst, but has three fuse-holes through which the flame rushes, firing everything within its influence. Carcasses are of considerable use in bombardments for setting fire to buildings, vessels lying in harbors, etc. They will continue to burn for 8 or 10 minutes, and are not even extinguished by water.

Carcassonne, kär-ka-sŏn', France, capital of the department of Aude, on both sides of the river Aude and on a branch of the Canal du Midi, 53 miles south of Toulouse. It consists of an old and a new town, which communicate by a bridge of 12 arches spanning the river. The old town is surrounded by a double wall, part of it so ancient as to be attributed to the Visigoths, and is defended by a castle. Its streets are narrow, dirty, and desolate, forming a striking contrast to those of the new town, which is regularly built, and has many handsome modern houses. The boulevards are finely planted. The chief manufacture is that of woolen cloth, which is exported chiefly to the Levant, the Barbary states, and South America. There is also trade in wine, grain, brandy, fruit, and leather. Pop. 31,000.

Carchar'odon, an extinct genus of sharks of the Tertiary Period, nearly related to the modern white "man-eater" shark, but of gigantic size. The flat, triangular, sharp-edged teeth found commonly in the marl-beds of the Atlantic coast, are sometimes six inches wide, indicating that the animal was not less than 60 feet in length.

Carchemish, kär'kĕm-ĭsh, an ancient city on the Euphrates, formerly thought to be the same as the Roman Circesium, but now is more generally located near Jerabis, a village on the west bank of the Euphrates. It was the northern capital of the Hittites; was once captured by Tiglath-Pileser I., and made to pay tribute by Asurnazirpal; but was not finally subdued by the Assyrians until taken in 717 B.C. by Sargon II., who deported the inhabitants and settled Assyrians in the city. In 608 B.C. it was captured by the Egyptian Pharaoh Necho. At this time Josiah, king of Judah, was killed (mentioned in 2 Chron. xxxv.); but the city was retaken by Nebuchadnezzar in 605.

Carcinoma. See TUMOR.

Card, Henry, English miscellaneous writer: b. Egham, Surrey, 1779; d. Great Malvery, 4 Aug. 1844. He was educated at Westminster School and Pembroke College, Oxford. In 1815 he was presented to the vicarage of Great Malvern, Worcestershire, and in 1832 to that of Darmington, Herefordshire. He was

elected a Fellow of the Royal Society, 2 March 1820, and also a Fellow of the Royal Society of Antiquaries and of the Royal Historical Society. He was a prolific writer and some of his published works are: 'The History of the Revolutions of Russia' (2d ed. 1804); 'Historical Outline of the Rise and Establishment of the Papal Power' (1804); 'Thoughts on Domestic or Private Education' (1807); 'The Reign of Charlemagne, Considered Chiefly with Reference to Religion, Laws, Literature, and Manners' (1807); 'Literary Recreations' (2d ed. 1811); 'Beauford, or a Picture of High Life,' a novel (2 vols. 1811), etc.

Card Index. See LIBRARY LABOR-SAVERS.

Cardamine, kär'dă-mīn, a genus of plants of the natural order *Cruciferæ*, containing about 60 species with a very wide distribution. They are herbaceous plants with usually pinnate leaves, white or lilac flowers of the usual cruciferous type, and the siliquose fruit which characterizes a section of the order. One of the best-known American species is the cuckoo-flower (*C. pratensis*), growing in wet places from Vermont to New Jersey, westward to Wisconsin, and northward. *C. hirsuta* is a common weed everywhere, varying in size, according to soil, from 6 to 18 inches in height. The leaves and flowers of this species form an agreeable salad. This species produces young plants from the leaves, all that is necessary being to place them on a moist grassy or mossy surface. These species were imported to this country from Europe. The indigenous American species are *C. rhomboidea,* spring cress, and *C. rotundifolia,* mountain water-cress, common throughout the eastern part of the United States. *C. amara,* the bitter-cress, is not unlike the water-cress, but may be readily distinguished by its dark-colored anthers.

Car'damom, the capsule and seed of several species of plants of the order *Zingiberaceæ*, perennial plants, growing in the East. The fruit is used as a stimulant and aromatic. Triangular capsules, from four to five lines in length, contain the seeds, which are of a brown color, a pleasant, aromatic smell, and a warm, pepper-like taste. The cardamoms known in the shops are produced by *Amomum angustifolium,* a Madagascar plant, *A. cardamomum,* a native of Sumatra, and other eastern islands. Those recognized in the United States pharmacopœia, called true or officinal cardamoms, and known in commerce as Malabar cardamoms, are the produce of *Elettaria* (*Alpinia*) *cardamomum,* a native of the mountains of Malabar and Canara.

The seeds of cardamom are widely employed in medicine as the basis of vehicles for carrying disagreeable drugs, and also as carminatives and digestants. The volatile oils of cardamom act like other volatile oils in stimulating peristalsis, thus expelling excess of intestinal gases, and they also increase the gastric and intestinal secretions.

Cardan, or Cardano, Girolamo, jē-rō'lä-mō kär dăn or kär-dä'nō, Italian philosopher, physician, and mathematician: b. Pavia, 24 Sept. 1501; d. Rome, 21 Sept. 1576. He was educated from his fourth year in the house of his father. At 20 he went to Pavia to complete his studies, and after two years began to explain Euclid. He was subsequently professor of mathematics and medicine in Milan (1534). His biographers differ with regard to his religious opinions, but he was lost in cabalistic dreams and paradoxes, and pretended to have a familiar demon from whom he received warnings, etc. All this excited the theologians against him, who even accused him of atheism, though the charge was without foundation. He believed so implicitly in astrology that he drew his own horoscope several times, and ascribed the falsehood of his predictions, not to the uncertainty of the art, but to his own ignorance. His two works, 'De Subtilitate Rerum,' and 'De Varietate Rerum,' contain the whole of his natural philosophy and metaphysics. Cardan wrote also on medicine, and his fame as a physician was very great. His highest claims to the gratitude of the learned rest on his mathematical discoveries. Cardan, it is said, was told that Tartaglia had discovered the solution of cubic equations, and obtained the secret from him by stratagem and under promise of silence, but published the method in 1545, in his 'Ars Magna.' The honor of giving his name to the invention has remained to him who first made it known, and it is still called the formula of Cardan. It is universally believed that Cardan discovered some new cases, which were not comprehended in the rule of Tartaglia; that he discovered the multiplicity of the roots of the higher equations, and finally the existence of negative roots, the use of which he did not, however, understand. All his works, to the number of more than 50, are contained in the standard edition of Sponius (Lyons 1663).

Card'board, a thick paper, or aggregation of paper or paper-stock, made by pasting several sheets of paper together and compressing the product between rollers. The finest cardboard, or Bristol board, such as is used for visiting-cards and in the arts, is so made of white paper only. It is known as three-, four-, six-, or eight-sheet board, according to the number of layers of paper. A cheaper grade of white cardboard is composed of coarse white paper for the inner layers, and a finer facing paper on the outside. Another variety of cardboard is that used by boxmakers, and is made from coarse brown paper glued and rolled, and faced with white or colored paper, or unfaced, according to the use to which it is to be put. A coarser grade yet is known as millboard. This is used by bookbinders for the covers of books, by boxmakers, and for other work in which strength is of more value than appearance. Fine qualities of millboard are also made to some extent. See PAPER AND PAPER-MAKING.

Cardenas, Bernardino, bĕr-nar-dē'nō kär'dā-näs, Peruvian ecclesiastic: b. Chuquisæa, about 1595; d. Santa Cruz de las Sierra, about 1667. Entering the order of Franciscans he became a missionary among the Indians, being made bishop of Paraguay in 1640. On account of differences with the Jesuits he was twice expelled from his diocese. When Osorio, the governor, died in 1649, Cardenas was elected to fill the vacant position and immediately expelled the Jesuits from Asuncion. He was then deposed, imprisoned and excommunicated, but restored in 1662, and in 1666 made bishop of Santa Cruz de la Sierra. He wrote a defense of his career entitled 'Manuel y relacion de las Cosas del Reyno del Peru.'

Cardenas, kär'dā näs, Cuba, a seaport in the northern part of the province of Matanzas, situated on Cardenas Bay. It is connected with Havana by rail, and has a large trade in sugar and molasses. On 11 May 1898 the Spanish shore batteries and gunboats at Cardenas attacked the United States vessels blockading the port, and in the engagement the United States torpedo-boat Winslow was disabled, and Ensign Worth Bagley (q.v.) and four sailors were killed.

Cárdenas y Rodriguez, José (hō-sā') **M. de,** Cuban poet and prose-writer: b. Matanzas, 1812; d. 1882. Many of his humorous sketches of Cuban life have been translated into French and published in the 'Revue des Deux Mondes.' Besides a good comedy, 'A Deaf Uncle,' he has written a collection of fables, some of which have been translated into English; and numerous poems.

Cárdenas y Rodriguez, ē rō drē'gāth, **Nicolas de,** nē'kō-lä dā, Cuban poet and novelist: b. Havana, 1814; d. 1868. His works comprise: 'Poetical Essays' (1836); 'Scenes from Life in Cuba' (1841); 'The Two Weddings,' a novel (1844); 'Diego de Velazquez,' a drama. He was also a regular contributor to periodicals.

Cardi, Lodovico, lō-dō-vē'kō kär'dē, surnamed Civoli, or Cigoli, Italian painter and architect: b. 1559; d. 1613. He studied painting under Allori and S. di Titi, and afterward formed his style on the works of Andrea del Sarto and Correggio, but more especially on the noble and spirited productions of Baroccio at Florence. His architectural works, in which he followed Michael Angelo, possess considerable merit. His most celebrated picture is 'The Lame Man Cured,' which is in St. Peter's at Rome. Sacchi considers it entitled to hold the first place among the pictures in Rome, after 'The Transfiguration' of Raphael, and the 'St. Jerome' of Domenichino. His 'Martyrdom of St. Stephen,' executed for the convent of Monte Domini, and his 'Tobias Entertaining the Angel,' now in the Hermitage at St. Petersburg, are also noble paintings.

Car'dia, the upper or cardiac orifice of the stomach, as distinguished from the intestinal opening or the pylorus.

Car'diac Medicines, medicines which act upon the heart. They may be roughly classified into those which stimulate the heart; heart tonics, which brace or tone the heart; and heart sedatives or depressants, which quiet or soothe the heart. To the first group belong ammonia, ether, camphor, and alcohol; to the second, digitalis, squills, lily of the valley, and strophanthus; and to the last, aconite. Several of these must be administered with great care.

Cardial'gia, an intense pain over the general heart region. It is usually due to stomach disturbance, heartburn, and is often accompanied by pains in the œsophagus. Heartburn is nearly always due to the presence of large amounts of gas, causing pressure. These gases usually accompany and cause an indigestion.

Car'diff, Wales (Welsh, *Caerdydd, Caerdyv,* the fortress or city on the Taff), a municipal and parliamentary borough and seaport, the capital of Glamorgan, and largest town of Wales, is situated on the Taff, 1½ miles from its mouth in the estuary of the Severn, 170 miles west of London. The castle, situated on the north side of the town, was begun by Iestyn ap Gwrgan, the last Welsh prince, in the year 1080, and finished by Robert Fitzhamon, a kinsman of William the Conqueror, in 1110. In 1648 Cardiff Castle was besieged by Cromwell, who bombarded it for three successive days. It is at present a residence of the Marquis of Bute. The town of Cardiff, as the outlet for the mineral fields of South Wales, has grown up with great rapidity. In tonnage entered and cleared it is the third port in the United Kingdom, and in coal exported is the first. Among the public buildings, besides the parish churches, are included several places of worship belonging to the Baptists, Methodists, Independents, Roman Catholics, etc., a university college (for South Wales and Monmouthshire), established 1883, town hall, market hall, custom-house, law courts, militia barracks, theatre, county jail, literary and scientific institution, free library, and museum; a number of national, British, parochial, and other schools; an infirmary, almshouses, dispensary, etc. In recent years the streets have been improved by the corporation, and a water-supply brought from the Brecknockshire Beacons. The docks are extensive and well constructed, and further improvements to the port, including a new dock, tidal harbor, and a low-water pier, have been carried out. The docks, which were constructed by the Marquis of Bute at a cost of nearly $20,000,000, cover an area of about 200 acres. Iron ship-building is carried on, and there are iron and other works on a large scale. In 1900 the number of ships cleared was 14,437, of 9,331,344 tons. The town (with Cowbridge and Llantrissant) returns one member to the House of Commons. Pop. (1850) 18,000; (1901) 164,420.

Car'diff Giant, the name given to a roughly carved statue of a man exhibited in various parts of the United States in 1870 as a "petrified man." It was originally carved in California from a block of gypsum and subsequently buried in Onondaga County, N. Y., near the village of Cardiff, and hence its name. It was alleged to have been accidentally discovered there in October 1869, and the general public, as well as some scientists, were at first deceived by its appearance. In very recent years the authors of the fraud confessed their share in the hoax.

Car'digan, James Thomas Brudenell, Earl of, English general: b. Hambleton, 16 Oct. 1797; d. 28 May 1868. He was educated at Christ Church, Oxford, and was gazetted 6 May 1824, as cornet in the 8th Royal Irish Hussars, under the courtesy title of Lord Brudenell. His family influence and wealth in England procured for him a rapid promotion, and in a few years he had attained the rank of major. Lord Brudenell was next, 3 Dec. 1830, made lieutenant-colonel of the 15th Hussars. He was a member of the House of Commons from the period of his coming of age in 1818, until 14 Aug. 1837, when on the death of his father, he became Earl of Cardigan. After his regiment returned from India Lord Cardigan got himself into difficulties with the officers, who, one by one, had to sell out until the feeling of the regiment broke into mutiny

in what was known as the "black bottle quarrel." This quarrel arose in 1840, while Lord Cardigan's regiment was stationed at Canterbury. One of his officers, Capt. Reynolds, having caused wine to be placed on the table in a "black bottle," Lord Cardigan accused him of degrading the mess to the level of a pot-house. This led to angry words: Capt. Reynolds was placed under arrest, demanded a court-martial, but this privilege was withheld from him, and, as the public thought, unjustly. The excitement created by this affair and by his subsequent misunderstanding with another officer also of the name of Reynolds, had hardly subsided, when he fought a duel with Capt. Harvey Tuckett because this officer had censured his conduct in the *Morning Chronicle*. Capt. Tuckett was wounded, and Lord Cardigan tried before the House of Lords, but, although acquitted, public opinion was against him. His reputation, however, as an accomplished cavalry officer, and the satisfaction which the Duke of Wellington expressed in 1848, with the efficiency of the 11th Hussars' Regiment, which was under Lord Cardigan's charge, led to his promotion. On the outbreak of the Crimean war Lord Cardigan was raised to the rank of major-general, and appointed brigadier in command of the light cavalry brigade. This brigade constituted the celebrated "Six Hundred," whose charge at Balaklava will long be remembered as one of the bravest yet wildest feats, perhaps, ever told of in the history of war. On that occasion (25 Oct. 1854), Lord Cardigan is said to have received from Lord Lucan, his brother-in-law, an order to capture certain guns from the Russians. A mile and a half had to be traversed, under fire, before the enemy could be met, and the Russian forces stood in formidable array in every direction. The enterprise seemed hopeless. Cardigan, however, led on the charge, and actually took the guns, his men cutting their way through the infantry support and through the cavalry, and then back again, under the play of the Russian batteries, but with fearfully diminished numbers, the survivors not exceeding 150. As the hero of this daring exploit, Lord Cardigan was received with great enthusiasm on his return to England, and appointed inspector-general of the cavalry. The charges, however, subsequently alleged by the Crimean commissioners, tended to reduce the high estimate placed upon his services.

Car'digan, Wales, a seaport town, municipal and formerly a parliamentary borough, capital of Cardiganshire, on both banks of the Teifi, about five miles from its mouth, and 200 miles west-northwest of London. The most noteworthy buildings are St. Mary's Church, upward of 200 years old; several dissenting chapels, all fine edifices; the shire hall, Cardigan county school, the national and board schools, etc. Cardigan Castle, famous in Welsh history, stands at the foot of an eminence near the bridge, two circular bastions only now remaining of it. Brick, tile, and pottery works are here, and two iron-foundries are employed chiefly in the manufacture of agricultural implements. The salmon fishery is extensively carried on in the neighborhood, and many of the male population are engaged in the mercantile navy. Pop. (1901) 3,511.

Car'diganshire, Wales, a maritime county, having Cardigan Bay on the west, and on the land side chiefly Carmarthen, Brecknock, Radnor, and Montgomery; area, 443,387 acres. The northern and eastern parts are mountainous, the southern and western districts more level. The soil in the vales is chiefly peat, capable of growing either grain or grass, by the application of lime; the higher grounds consist of a light sandy loam, and the mountains are composed chiefly of clay-slate. The agricultural produce is comparatively small. Cattle, sheep, and wool are the staple commodities. The chief crops are barley and oats, very little wheat being grown. The lead-mines still yield largely, and zinc is obtained in several places. The coast-line is long, and many of the male population are sailors and fishermen. The principal towns are Cardigan, the county capital, Aberystwith, Lampeter, Tregaron, and Aberaeron. There are few manufactures. Pop. (1901) 60,237.

Cardinal von Widdern, Georg, gā ōrg kär'dē näl fŏn vĭd'dĕrn, German military historian: b. Wollstein, 12 April 1841. He entered the army in 1859; was engaged in the war of 1866 and the Franco-Prussian war; and was professor at the military school at Neisse. He retired in 1890 and has since lived in Berlin. He wrote 'Der Rhein und die Rheinfeldzüge' (1869); 'Belgien, Nordfrankreich, der Niederhein und Holland als Kriegsfeld'; 'Die Russischen Kavallerie-divisionen und die Armeeoperationen in Balkanfeldzuge' (1878); 'Das 76 Armeekorps und die 7 Kavallerie-division wahrend ihner selbständigen Operationen in Moselfeldzug bli Metz' (1886); and a number of works on military tactics.

Cardinal-fish, a fish of the family *Cheilodipteridæ,* characterized by two dorsal fins, the anterior of which consists of from six to nine spines. The anal fin is short and has only two spines. The scales are large, and the color is often bright red, whence the name. They are especially abundant in the East Indian seas; but several species are found in America, one of which is known as "king of the mullets."

Cardinal Flower, the name commonly given to *Lobelia cardinalis,* because of its large, very showy, and intensely red flowers. It is a native of America, growing on the muddy banks of streams. Stems two to three feet high, the flowers in racemes. It admits of cultivation, and is much prized abroad, particularly in England.

Cardinal Grosbeak, or **Red-bird,** a large song-bird (*Cardinalis cardinalis*) of the finch family, very numerous in the southern United States. It is particularly distinguished for its loud, clear, sweet song, whose quality makes it popular as a cage-bird. It is a brilliantly red bird, with a vermilion head, its bill surrounded with a small band of glossy black, and having the long feathers of the crown erected into a conical crest. The female builds her nest, which is made of twigs, grasses, roots, etc., in bushes, and frequently breeds twice in a season, her bluish, brown-spotted eggs numbering about four. This bird is migratory only to a small degree, moving southward only along the northern limits of its range, and occasionally passing the winter in village gardens even in New England.

Cardinal Points, the four intersections of the horizon with the meridian and the prime vertical circle. They coincide with the four cardinal regions of the heavens, and are, of course, 90° distant from each other. The intermediate points are called collateral points. See COMPASS.

Cardinal Virtues, in morals, a name applied to those virtues to which all the rest are subordinate, or which comprehend all the others. The distribution of the virtues, which lies at the foundation of this notion, had its origin in the old Grecian philosophy, and the same number is found here as in the elements of nature. These principal virtues, as enumerated by Plato, are prudence, temperance, fortitude, and justice. The first three seem to relate to the duties of man toward himself, and to correspond with the triple division of the soul into the intellectual, the irrational (the seat of the sensual desires), and the seat of the affections. Justice either relates to our duties to others (God and men), or is the union of the three first virtues. This division appears to be peculiar to the old Pythagoreans. Aristotle divided them still farther. The Stoics, too, made the same division in their system of morals, and Cicero introduced it into his 'De Officiis.' Plotinus and many New Platonists divide the virtues into four classes — civil or political, philosophical or purifying, religious, and lastly, divine or pattern virtues: a division coinciding with the rest of his philosophical views. The influence of the ancient philosophers has made these cardinal virtues also a part of the Christian code. Some add to them the three "Christian virtues," faith, hope, and charity, and call the former philosophical. The imagination of artists has represented the cardinal virtues under sensible images. In modern times this division is regarded as useless in treating of ethics.

Cardinals, College of, an ecclesiastical body consisting of the highest dignitaries in the Roman Catholic Church. The name cardinal is applied to one of the principal advisers of the supreme pontiff as it is to the principal virtues or to the four points of the compass; etymologically cardinal is from *cardo,* linige, pivot, tenon, point around which anything turns. In the 11th century the term cardinal appears to have come into use to designate the "bishops collateral to the Pope," those whose sees are in the neighborhood of Rome, and to the clergy of the principal churches, parishes or *tituli* of the city; but probably *cardinalis* was at first said of a principal church rather than of its ministers. Nor was the term cardinal at first restricted to designation of churches and their clergy in Rome and its vicinity; for a long time, even down to 1585, date of the bull *Postquam* of Sixtus V., which forbade the application of the term to any but members of the sacred college, it was customary to call the ecclesiastics attached to mother-churches or to all cathedrals even, *cardinales.* The use of the word *cardo,* or its equivalent to express the relation of a bishop to his clergy and people, is very ancient: Saint Ignatius, bishop of Antioch (d. about 202), speaks of the bishop of a church as the pivot on which it turned. Till the issuance of the bull *Postquam* the title of cardinals was currently bestowed, but not by authority from the centre, upon the clergy of cathedral chapters in countries beyond the Alps, as those of the sees of Bourges, Metz, Cologne, Compostella, and other cities in Germany, Spain, and France; even in Italy the same usage was common; for it was with the name *Cardinalis* as with the name *Papa:* they both were originally applied to church dignitaries, to pastors, and church officers generally; later their application was restricted.

Ever since the reign of Nicolas II. the cardinals have possessed the privilege of electing the Pope. The decree of Pope Nicolas (1059) provides that on the death of the Pope the cardinal-bishops shall assemble in council and then the rest of the sacred college shall join them. In naming the Pope the college must take into account the choice of the clergy and people; only in case no Roman priest is found eligible in every way, shall the choice fall upon one that is not a Roman. In the 12th century the sacred college comprised seven cardinal-bishops of the "suburbicarian" churches, Ostia, Rufina, Porto, Albano, Tusculum, Sabina, and Palestrina; the cardinal-priests were 28, and were the rectors of as many churches in the city; there were 18 cardinal-deacons, of whom 14 belonged to the clerical staff of churches in the city, and 4 to the papal court or household. The members of the sacred college are yet styled by the titles of churches in the city, but are no longer in any sense ministers of those churches or parishes. And, like other church offices and church dignities the cardinalate became an object of ambition or of cupidity; popes bestowed the honor, princes and popes bestowed the dignity and the emoluments of episcopal and primatial sees, with the cardinalate annexed, upon minors and infants; thus, John de Medici was raised to the cardinalate at the age of 14 years, being already vested with a number of highest church dignities; and as late as 1740 a prince of the house of Bourbon was archbishop of Toledo and cardinal at the age of eight years.

According to the present constitution of the sacred college that body consists of 70 members — though very rarely indeed, if ever, are all the places filled. Of the 70 six are cardinal-bishops, and they are the ordinaries of sees in the neighborhood of Rome; 50 cardinal-priests, and 14 cardinal-deacons. In the year 1903, the cardinal-bishops numbered five, all Italians; the cardinal-priests 52, and of these four were Spaniards, seven were Frenchmen, one German, one Belgian, one Pole, one American, three British and Irish, two Austrians, two Hungarians, one Bohemian; the rest were Italians. There were eight cardinal-deacons, among them one German and one Spaniard; the rest were Italians.

The scarlet hat is distinctive of the cardinalitial dignity, and above the double cross in the arms of an archbishop who is a cardinal is the figure of the scarlet hat with its tasseled pendants. The gown of the cardinal is scarlet (*purpura,* commonly rendered purple, but our "purple" in the language of the ritual is violet *violaceus*). Hence "to receive the hat" means to be made a cardinal; and to aspire to the purple is to aim at the cardinalitial dignity. Etiquette requires that a cardinal be addressed as Eminence; in English usually "your eminence," and every cardinal is *eminentissimus.* A bishop or archbishop who is a cardinal, uses such a formula as the following in official instruments

(the example is taken from the approbation of a book by an archbishop of Mechlin or Malines in Belgium):

"Engelbert, by the divine mercy, cardinal-priest of the holy Roman Church, of the title of Saint Bartholomew in the Island, archbishop of Mechlin, primate of Belgium," etc.

Carding, the process which wool, cotton, flax, etc., are made to undergo previous to spinning, to lay the fibres all in one direction, and remove all foreign substances. The card formerly consisted of a number of iron teeth arranged in a piece of leather of various lengths, and the material was combed by hand. For many years this work has been done by machinery, the cards being fine, long teeth fixed on leather strips called card-clothing, which are arranged on a series of cylinders so placed that the material is carried from one to another, until removed by still another and much smaller cylinder called the doffer, from which it is stripped by a moving comb, and then by a series of rolls is delivered in the form of a ribbon into a can, when it is ready for the drawing-frame, on which it is prepared for spinning.

Car'dioid, a heart-shaped curve. It is produced by drawing a great number of chords from a single point of the circumference of a circle, prolonging each beyond the further crossing of the circumference to a distance equal to the diameter of the circle, and joining the free ends by a smooth curve. It is a special case of the limaçon, in which the extension of the chords is of any uniform length. The limaçon was invented by Pascal.

Carditis, kär-dī'tĭs, an inflammation of the heart. The word is not now used, since more definite terms are accessible to designate particular types of inflammation. Thus myocarditis is an inflammation of the heart muscle, endocarditis, of the lining membrane, the endocardium; pericarditis, of the external membrane, the pericardium.

Cardona, kär-dō'nä, Spain, a town in the province of Barcelona, on the right bank of the Cardoner, 50 miles north-northwest of Barcelona. It has a castle. In its vicinity is a hill of rock salt 500 feet high, which affords inexhaustible supplies of salt. Pop. (1887) 3,708.

Cardoon', a garden vegetable (*Cynara cardunculus*), of the natural order *Compositæ*. It so closely resembles the artichoke (*Cynara scolymus*) that some botanists consider the two species merely as horticultural varieties. The plant, which is a native of southern Europe, is a thistle-like, tender perennial which is cultivated as an annual. Seed is usually sown in spring in a hotbed; the young plants are transplanted to the rich soil of the garden about four feet apart each way, and kept cleanly cultivated until the leaves are nearly full grown, when the plant is tied up, covered with straw and earth, to blanch for two or more weeks. The thick leaf-stalks and the mid-ribs are the parts desired. In America the plant is not very popular except with the foreign population.

Cards, pieces of cardboard, oblong in shape, bearing certain figures and spots; specifically, playing-cards used in various games of chance and skill. Playing-cards are probably an invention of the East, and some assert that the Arabs or Saracens learned the use of cards from the gypsies and spread them in Europe. The course that card-playing took in its diffusion through Europe shows that it must have come from the East, for it was found in the eastern and southern countries before it was in the western. The historical traces of the use of cards are found earliest in Italy, then in Germany, France, and Spain. The first cards were painted, and the Italian cards of 1299 are found to have been so. The art of printing cards was discovered by the Germans between 1350 and 1360. The Germans have, moreover, made many changes in cards, both in the figures and the names. The lanzknechtsspiel, which is regarded as the first German game with cards, is a German invention. Of this game we find an imitation in France, in 1392, under the name of lansquenet, which continued to be played there till the time of Molière and Regnard, and perhaps still longer. The first certain trace of card-playing in France occurs in the year 1361, and Charles VI. is said to have amused himself with it during his sickness at the end of the 14th century. The modern figures are said to have been invented in France between 1430 and 1461. It has been said that cards were known in Spain as early as 1332; but what is certain is that card-playing must have become prevalent in the course of the century, seeing it was prohibited by the king of Castile, John I., in 1387. Mr. De la Rue, the most extensive manufacturer of cards in England, obtained in 1832 a patent for various improvements in manufacture. The figures on cards had been generally produced by the outlines first being printed from copper plates, and the colors then filled in by stencilling. Mr. De la Rue's process was to print them from colored types or blocks exactly in the same way as calico-printing, but all the colors being in oil.

As early as the 15th century an active trade in cards sprung up in German, and was chiefly carried on at Nuremberg, Augsburg, and Ulm, the demand from France, England, Italy, Spain, and other countries producing great prosperity among the manufacturers. In England the manufacture of cards flourished especially under Elizabeth. But no sooner had cards come to be generally used in Europe, than they were prohibited by several governments, partly from moral considerations, the first games being games of chance; partly from considerations of political economy, as in England, where the importation of foreign cards was considered injurious to the prosperity of home manufacturers. The prohibition, however, only tended to increase the taste for cards. In England, under Richard III. and Henry VII., card-playing grew in favor. The latter monarch was very fond of the game, and his daughter Margaret was found playing cards by James IV. of Scotland, when he came to woo her. The popularity which cards gradually obtained in England may be inferred from the fact that political pamphlets under the name of "Bloody Games of Cards," and kindred titles, appeared at the commencement of the civil war against Charles I. One of the most striking publications of this kind was one in 1660 on the royal game of ombre. Pepys, in his 'Diary,' under the date of 17 Feb. 1667, states that on Sabbath evenings he found "the Queene, the Duchesse of York,

and another or two, at cards, with the rooms full of ladies and great men.»

The modern pack of cards, used in most of the familiar games, is 52 in number, containing four suits; clubs and spades (black), and hearts and diamonds (red). Thirteen cards compose a suit, consisting of king, queen, knave or jack, and ten pip-cards ranging in number of spots from one (ace) to ten. The figures of the four suits are supposed to have been originally intended for symbolical representations of the four great classes of men, and the names attached to these figures in England arose from a misapprehension of the names originally assigned to them. Thus, by the hearts are meant the gens de chœur (cœur), the choir-men or ecclesiastics, and hence these are called copas, or chalices, by the Spaniards; whose word espada, sword, indicating the nobility and warriors of the state, has been corrupted into the English spade. The clubs were originally trèfles (trefoil leaves), and denoted the peasantry; while the citizens and merchants were marked by the diamonds (carreaux, square tiles). The word knave (German, knab, boy), was used, of course, in its older sense of servant, or attendant on the knights. The natural rank of the cards in each suit is, king highest, and so on down to ace lowest; but in many games this rank is varied, as in whist, where the ace is put highest of all, above the king; in écarté, where it is put between the knave and the ten; and in bézique, where it is made the highest, but where the ten is put between it and the king; in quadrille, the rank of some of the cards is variable in every hand. Sometimes the pack of cards is reduced to 32, by excluding the six, five, four, three, and two of each suit; it is then called a «piquet pack.» An immense variety of games may be placed with cards, some involving chance only, others combining chance and skill, the best furnishing intellectual amusement. There are round games, in which any number of persons may join, as poker, hearts, loo, etc.; games for four persons, as whist, in its different forms, and euchre; for two, as piquet, écarté, bézique, cribbage, and penuchle, closely resembling bézique, and at present much played in the United States; and there is one game, solitaire, played in many ways, at which a single person often finds both restful diversion and pleasant occupation for the mind.

Carducci, or **Carducho, Bartolommeo,** bär-tō-lōm-mā'ō kär-doo'chē or kär-doo'chō, Italian artist: b. Florence, 1560; d. Madrid, 1608. He studied in Rome as a pupil of Zuochero, and later went to Spain, where he was a favorite of Philip III. Among his best works are 'Descent from the Cross,' and the 'Adoration of the Magi.'

Carducci, kär-dö'chi, **Giosuè,** Italian poet and philologist: b. Valdicastello, Tuscany, 27 July 1836. He was made professor of Italian literature in the University of Bologna in 1861. He had previously written essays on the history of literature; and a small volume of lyrics, 'Rimes' (1857). But his poetical genius is better shown in 'Inno a Satana' (1863); and 'Odi Barbare'; 'Nuove odi Barbare'; and 'Terze odi Barbare.' His employment of original poetic forms in the 'Odi Barbare' series has aroused much literary discussion. In criticism Carducci has published 'Studii leterarii' (1875); 'Bozetti critici e discorsi letterarii' (1875). See Chiarini, 'I critici italiani e la metrica delle Odi Barbare' (1878).

Carducci, or **Carducho, Vincenzo,** vĭn-chĕnt'sō, Italian artist: b. Florence, 1568; d. Madrid, Spain, about 1638. He was a brother of the preceding and was patronized by both Philip III. and Philip IV. of Spain, where his most important works are to be found. He was the author of 'Dialogos de las excelencias de las pintura' (1633).

Carduus, kär'dū-ŭs, a genus of plants belonging to the natural order *Compositæ,* resembling the thistles, common along the Mediterranean. They are almost all troublesome weeds, though some of them are said to possess medical properties which make them useful in fevers. Among the more common of them are the arvensis (corn-thistle, way-thistle, or creeping-thistle), which has strong fleshy roots extending underground, and difficult of extirpation; and *C. lanceolatus* (spear-thistle), which, both from its size and rough feeding, is a great robber of the soil, but from being only a biennial is more easily managed.

Card'well, John Henry, English clergyman: b. Sheffield, England, 20 June 1842. He was educated at Caius College, Cambridge, was ordained in the Established Church 1865, and was incumbent of St. Andrew's, Fulham, 1868–91. Since 1891 he has been rector of St. Anne's, Soho, London, and has been prominent in municipal politics and civic reforms. He has published 'The Story of a Charity School'; 'Two Centuries of Soho'; 'Men and Women of Soho, Famous and Infamous.'

Care Sunday, sometimes taken to be the Sunday immediately preceding Good Friday; but generally used to signify the fifth Sunday in Lent. Same as Passion Sunday.

Careen'ing, the process of heaving a vessel down on one side by applying a strong purchase to the masts, so that the bottom may be cleansed by breaming, that is removing by means of fire any growth which adheres to it, or any other necessary work effected. A half careen may take place when it is not possible to come at the bottom of the whole ship. Very few ships are now careened, more especially since the introduction of copper sheathing.

Carême, Marie Antoine, mä-rē äṅ-twän kä räm, French cook: b. Paris, 8 June 1784; d. there, 12 Jan. 1833. He wrote 'Le pâtissier pittoresque' (2d ed. 1842); 'Le mâitre d'hotel française' (2d ed. 1842); 'Le pâtissier royal parisien' (1828); 'L'art de la Cuisine française aux XIX. siécle' (1833).

Caret, kărā', a turtle. See HAWKSBILL.

Carew, ka-roo', **Richard,** English antiquarian and poet: b. East Antony, Cornwall, 17 July 1555; d. there, 6 Nov. 1620. He was a member of the House of Commons, high sheriff of Cornwall in 1586, and the author of a much valued 'Survey of Cornwall' (1602), and an English translation of a portion of Tasso's 'Jerusalem Delivered.'

Carew, Thomas, English poet; b. 1598; d. 1639. He was educated at Corpus Christi College, Oxford. Cultivating polite literature in the midst of a life of affluence and gaiety, he was the subject of much eulogy by Ben Jonson,

Davenant, and other writers of the period. In him was exhibited the not unusual transformation of the courtly and libertine fine gentleman into the repentant devotee. Carew is coupled with Waller as one of the improvers of English versification. The first collection of his poems was printed in 1640, and the last in 1824. His elegant masque of 'Cœlum Britannicum' was printed both in the early edition and separately in 1651, and the whole were included in Chalmers' 'British Poets.' Carew was much studied by Pope, and Dr. Percy also assisted to restore him to a portion of the favor with which he has come to be regarded. Specimens both of the sublime and the pathetic may be found in his works; the former in his admirable masque, and the latter in his epitaph on Lady Mary Villiers.

Carex, kār'ĕks, a genus of plants, belonging to the natural order *Cyperaceæ,* or sedges, and containing numerous species, which are found in all parts of the world where vegetation can exist, on the driest upland as well as the wettest marsh. The plants are perennial, often creeping, with sharp-keeled leaves and solid triangular stems. The flowers are without perianth and unisexual, being grouped in spikelets. The male flowers have usually three stamens, the female having a single style with three stigmas. The number of known species is above 2,500, and of these the United States has nearly 300. Hardly any of them have any agricultural value, but *C. arenaria,* the sand-sedge, is of use in binding the sand on many sea-shores. In parts of the United States a poor quality of hay is made from some of the sedges. *C. japonica variegata* is an elegant variety cultivated by florists.

Ca'rey, Henry, English composer and poet: b. London, 1696; d. there, 1743. He is supposed to have been a natural son of George Saville, Marquis of Halifax. His first instructor in music was a German, named Linnert, but he was afterward more thoroughly trained under Roseingrave and Geminiani. He was inexhaustible in the invention of new, pleasing, and often deeply pathetic melodies, to which he not unfrequently furnished the words. His 'Sally in Our Alley' is still a well-known song. He has also been said to be the author of 'God Save the King,' but this appears to be doubtful. He supported himself by public and private teaching, but his whole life was a continued struggle with poverty, and it has been said that at last, in a fit of despair, he committed suicide (1743). His collected songs were published in 1740. Among other works are: 'Teraminta' (1732) and other operas; 'Chrononhotonthologos,' «the most tragical tragedy ever yet tragedized» (1734), a burlesque; 'The Wonder, or An Honest Yorkshireman' (1735); and 'The Dragon of Wantley' (1737). His dramatic works were published together in 1743.

Carey, Henry Charles, American political economist: b. Philadelphia, 15 Dec. 1793; d. there, 13 Oct. 1879. He was the eldest son of Mathew Carey, and in 1814 became a partner in his father's bookselling and publishing firm, where he continued until 1835. In that year he published an essay on 'The Rate of Wages,' which he afterward expanded into 'The Principles of Political Economy' (1837–40). His other important works are: 'The Credit System in France, Great Britain, and the United States' (1838); 'The Past, the Present, and the Future' (1848); 'The Principles of Social Science' (1858–9); 'Letters on Political Economy' (1860 and 1865); 'The Unity of Law' (1872). Originally a free-trader, he became an advocate of protection on the ground of temporary expediency; held that the growth of population was self-regulating; and was opposed to the theories of Ricardo and others on the law of diminished returns from the soil and on rent. He was also opposed to any arrangement on the subject of international copyright. Some of his works have been translated into other languages, and his writings have had considerable influence on economical speculation.

Carey, James F., American socialist leader: b. Haverhill, Mass., 19 Aug. 1867. He received a common school education and learned the shoemaking trade. In 1895 he was chairman of a convention at Boston, which amalgamated three national organizations of shoemakers into one union. In 1894 he was one of the leaders in the agitation of the unemployed on Boston Common, and the governor appointed him a commissioner of the unemployed, but he was not confirmed. He was later elected president of the Haverhill common council. In 1898, 1899, and 1900 he was elected to the Massachusetts House of Representatives, twice defeating a combination of the Democratic and Republican parties. He was the first Socialist ever elected to political office in New England.

Carey, Mathew, Irish writer and bookseller: b. Dublin, 28 Jan. 1760; d. Philadelphia, 16 Sept. 1839. After a varied experience, including imprisonment for offending publications, he came to the United States in 1784, and in Philadelphia began to publish the *Pennsylvania Herald.* A few years later he became a bookseller, and an extensive publisher. The best known of his political writings was his 'Olive Branch' (1814). It was an effort to promote harmony among political parties during the War of 1812. It passed through 10 editions. In 1819 he published his 'Irish Vindications,' and in 1822, 'Essays on Political Economy.'

Ca'rey, Rosa Nouchette, English novelist: b. London. She began writing novels in 1868, and her fictions, in which the literary element is not a very strong feature, have been very popular with the average, uncritical reader who demands only to be entertained and cares little or nothing for literary style. They include 'Wee Wifie' (1869); 'Nellie's Memories' (1868); 'Barbara Heathcote's Trial' (1871); 'Robert Ord's Atonement' (1873); 'Wooed and Married' (1875); 'Heriot's Choice' (1879); 'Queenie's Whim' (1881); 'Mary St. John' (1882); 'Not Like Other Girls' (1884); 'For Lilias' (1885); 'Uncle Max' (1887); 'Only the Governess' (1888); 'Basil Lyndhurst' (1889); 'Lover or Friend' (1890); 'Sir Godfrey's Grand-daughters' (1892); 'Men Must Work' (1892); 'The Old, Old Story' (1894); 'Mrs. Romney' (1894); 'The Mistress of Brae Farm' (1896); 'Other People's Lives' (1897); 'Mollie's Prince' (1898); 'Twelve Notable Good Women'; 'My Lady Frivol' (1899); 'Rue with a Difference'; 'Life's Trivial Round' (1900); 'Herb of Grace' (1901); 'The Highway of Fate' (1902).

Carey, William, English Orientalist and missionary: b. Paulerspury, Northamptonshire, 17 Aug. 1761; d. Serampore, India, 9 June 1834. He was early apprenticed to a shoemaker, and continued to work at his trade till he was 24. With what assistance he could procure he acquired Latin, Greek, and Hebrew, and studied theology. In 1786 he became pastor of a Baptist congregation at Moulton, and in 1787 was appointed to a similar situation in Leicester. In 1793 he sailed for the East Indies as a Baptist missionary, but became overseer of an indigo factory. He studied languages and natural history, and collected a rich store of Oriental knowledge. In 1800, in conjunction with Marshman, Ward, and others, he founded the missionary college at Serampore; the year following he became professor of Sanskrit, Bengali, and Mahratta at the newly erected Fort William College, Calcutta. In Serampore he had a printing-press for more than 40 different Indian languages, and issued various translations of the Scriptures. His first work was a Mahratta Grammar. It was followed by other works, including a Bengali 'Lexicon,' in which he was assisted by Felix Carey, his son. Under his direction the whole Bible was translated into 6, and the New Testament into 21 languages or dialects of Hindustan; and considerable progress was made with the translation of the whole Scriptures into Chinese. He also edited Shroeder's Lexicon of the Thibetan language, and Roxburgh's 'Flora Indica,' in which a genus of plants which he discovered is named after him, *Careya*. He established an agricultural society at Calcutta, and a botanical garden, at his own expense, at Serampore. See his 'Life' by Dr. G. Smith (1885).

Cargill, kär'gĭl, **Donald,** Scotch covenanting preacher: b. Rattray, Perthshire, about 1619; d. Edinburgh, 27 July 1681. He was educated at Aberdeen and St. Andrews, and became minister of the Barony Church in Glasgow in 1655. At the Restoration he refused to accept collation from the archbishop, and was exiled beyond the Tay. In 1679 he took part in the battle of Bothwell Bridge, where he was wounded, but succeeded in escaping to Holland. In 1680 he published, along with Richard Cameron, the 'Sanquhar Declaration.' In September of the same year he formally excommunicated King Charles II., Duke of York, and other great personages. After avoiding pursuit for several months, in May 1681, he was captured, and at Edinburgh tried and sentenced, and 27 July was beheaded.

Car'hart, Henry Smith, American scientist: b. Coeymans, N. Y., 27 March 1844. He was graduated at Wesleyan University in 1869, and since then has taught physics and chemistry. Since 1886 he has been professor of physics at the University of Michigan. He has written 'Primary Batteries'; 'University Physics'; 'Electrical Measurements'; and other books.

Carheil, Étienne de, ä-tē-ĕn dė kä-rä-ē, French Jesuit missionary in North America: d. after 1721. He labored for more than half a century among the Canadian Hurons and Iroquois, and was long stationed at Michilimachinac.

Ca'ria, in ancient geography, the country forming the southwest corner of Asia Minor, bounded on the north by Lydia or Mæonia, from which it was separated by the Mæander; on the east by Phrygia, on the southeast by Lycia, and on the south and west by the Mediterranean. Some confusion, however, exists in regard to its boundaries. Part of it was settled by Greek colonies of Ionians and Dorians, who dispossessed the original inhabitants. It was included in the dominions of Crœsus, king of Lydia, and on his overthrow by Cyrus was transferred to the Persian monarchy, under whose protection a dynasty of Carian princes was established. Halicarnassus was the residence of these sovereigns, among whom were the two celebrated queens, the first and second Artemisia. The progress of the Roman conquests ultimately extinguished the independence of Caria, and about 129 B.C. it was incorporated in the Roman province of Asia.

Cariaco, kä-rē-ä'kō, Venezuela, a seaport in the state of Bermudez, situated to the east of the Gulf of Cariaco, near the mouth of a river of the same name, adjoining a large plain, covered with plantations. Its trade is chiefly in cotton and sugar. The Gulf of Cariaco is 38 miles long, from 5 to 10 broad, from 80 to 100 fathoms deep, surrounded by lofty mountains. Pop. 7,000.

Cariacou, kăr'ĭ ă koo, the name given to American deer of the genus *Cariacus*, found in all parts of North America up to lat. 43° N. It is smaller than the common stag, and its color varies with the seasons from reddish-brown to slaty-blue.

Cariama, sä-rē-ä'mą, a bird (*Cariama cristata*), a native of Brazil and Paraguay, where its loud scream is a familiar sound on the campos, and where it is domesticated and trained to guard fowls. With an allied Argentine bird (*Chunga burmeisteri*) it constitutes a family (*Cariamidæ*) of great zoological interest, combining as it does characters of the bustards, caracara eagles, and cranes, with each of which it has been at times associated.

Carib, kăr'ĭb, a native American race which attained its highest development in the West Indies. Originating in the valley of the Orinoco, this race spread along the coasts, northward and southward, to a great distance, and especially from island to island of the Lesser and Greater Antilles and the Bahamas. At the time of the discovery of America its language was spoken, with dialectic variations, from the coast of Florida to lower Brazil,—wherever large canoes could carry the swarming, warlike tribes. The Caribs were the Vikings of South America. The race name survives in "Caribbean" Sea, "Caribbee" Islands, the word "cannibal," etc.; the race itself is still well represented at various points in South America. In the West Indies, however, the large native population disappeared rapidly after the Spanish conquest, Caribs and other tribes of the same stock (Arawaks, Lucayos, Boriqueños, etc.) either succumbing under the new conditions or losing their distinctive characteristics by blending with Europeans and Africans. Surviving groups of West Indian Caribs may be studied to-day in the island of Dominica. A few remained in Martinique and St. Vincent up to the time of the volcanic eruptions in 1902. Great Britain deported 5,000

Caribs from St. Vincent to the island of Ruatan in the Gulf of Honduras in 1796; thence they migrated to the Central American coast, where their numerous descendants have become a not inconsiderable element in the population of the mainland. In the 'Proceedings of the American Association for the Advancement of Science' (1902, Vol. LI.), Mr. J. Walter Fewkes of the Bureau of American Ethnology calls attention to the different characteristics which the Caribs displayed in different circumstances and localities. Thus the natives in the Bahamas, Cuba, Haiti, and Porto Rico were mild, agricultural people who had lost in vigor, while gaining a rudimentary knowledge of the arts of peace, by their sedentary life. On the other hand, constant incursions from the home of the race (the Orinoco region in Venezuela) kept alive the savage customs and ferocious spirit of the Caribs of the Lesser Antilles. Such incursions took place even after the date of the Spanish settlements. The houses of the more peaceful Carib communities did not differ greatly from those of the peasantry in the same regions at the present time. In lieu of clothing, Carib men and girls covered their bodies, as well as their faces, with paint, to protect them from the bites of insects and the heat of the sun. A woven cloth of palm fibre, called *nagua,*—a breech-cloth with long ends,—was worn by the chiefs and the married women. For purposes of decoration, and to distinguish members of one family or community from those of another, designs of animals and plants were painted on the body. Their social organization closely resembled that of the North American Indians, the unit of organization being the clan, ruled by a *cacique* (chief). Combinations were sometimes formed by a number of caciques for mutual defense, and extensive territories were subjected to the control of the more ambitious leaders. Among the insignia of the cacique's rank were the gold disk called *guarim,* worn on his breast, and a stone amulet tied to his forehead. His numerous wives were practically slaves. *Ex officio,* he was a member of the priesthood. Columbus at first received the impression that the Caribs lacked spiritual insight; longer sojourn among them, however, convinced him that they worshipped many supernatural beings whom they represented by idols, called *zemis;* they had temples for this purpose, in which rude idols were set up to be consulted as oracles by the priests. It is probable that belief in a future life, although not universally held, as some authorities assert, was generally taught by the priests; and it is quite certain that the latter possessed great influence, being physicians to the people as well as ministers to the *zemis.*

Like other savage races of the region from which they came, the Caribs were anthropophagi; yet the evil prominence given to them through the coining of the word *cannibal* (a Latinized form of *Carib*) is not wholly merited. The discoverers, finding a great number of human skulls in the Carib houses, jumped to the conclusion that each skull was the trophy of some revolting feast. In point of fact, the Caribs, being ancestor-worshippers, preserved these relics in honor of defunct members of their family.

MARRION WILCOX,
Authority on Latin-America.

Caribbean (kăr-ĭ-bē'ăn) **Sea,** a part of the Atlantic Ocean occupying a basin 750,000 square miles in area, bounded by South and Central America, and the Greater and Lesser Antilles. Its perimeter is wholly mountainous. Mountain folds (continued in submarine ridges from the Greater Antilles to Honduras) mark its limits on the north and south; but the volcanic chain of the Lesser Antilles rises on the east, and the volcanoes of Central America in the remote past formed a wall separating it from the Pacific on the west. Separating it from the Atlantic are steep submarine ridges, of which the Lesser Antilles are the summits. A portion of the broad equatorial stream, which flows from east to west, from the coast of Africa to that of Brazil, enters the Caribbean between the islands at the southern end of the Antillean chain: the waters of this sea, therefore, move from east to west and northwest, and seek an exit through the Yucatan Channel. But the latter is too small to allow an outflow equal to the inflow into the Caribbean; so that, after the trades have forced the equatorial water into the Caribbean basin, it must remain there a considerable length of time, thus becoming superheated, before it passes into the Gulf of Mexico, where, owing to similar differences between the rate of inflow and outflow, the water becomes still more superheated before passing through the Florida Straits as the Gulf Stream. The main westerly current in the Caribbean, after passing through the Banks Strait, between the Mosquito Reef and Jamaica, is joined by the current of the Windward Channel. The trade-winds, blowing with a steady velocity across the Caribbean region, from east to west, make the surface of this sea much rougher than that of the Gulf of Mexico; they mitigate the tropical heat at all points where their influence is felt; and the moisture they bring from the Atlantic is precipitated in the form of abundant rains against the eastern slopes of the mountains, both on the islands and the mainland. Hence the distinction between "windward" and "leeward" regions, insisted upon especially in the West Indies. The Gulf of Mexico, sheltered behind the Antilles and Yucatan, is practically a "leeward" expanse; but the summer climate of Texas and the great plains is somewhat modified by Caribbean trade-winds.

Recent studies of the Caribbean basin have disclosed its interesting submarine topography —"a configuration which, if it could be seen, would be as picturesque in relief as the Alps or Himalayas. Nowhere can such contrasts of relief be found within short distances. Some deeps vie in profundity with the altitudes of the near-by Andes. . . . Some of the depressions, like the Bartlett Deep, are narrow troughs, only a few miles in width, but hundreds of miles in length, three miles in depth, and bordered by steep precipices. . . . There are long ridges beneath the waters, which, if elevated, would stand up like islands of to-day. . . . Again, vast areas are underlain by shallow banks . . . often approaching the surface of the water, like that extending from Jamaica to Honduras. . . . The greater islands and the mainlands are bordered in places by submerged shelves." (From 'Cuba and Porto Rico': see authorities below.) All the islands are, then, to be regarded, from a physiographic point of view, as the "tops of a varied configura-

tion which has its greatest relief beneath the sea»; and some of these submarine valleys and mountains have yielded a surprising number of animal forms previously unknown. Dredgings in depths of over 2,000 fathoms have brought to light new species of crustacea, and forms resembling the fossils of past geological epochs are taken alive in those profound marine valleys. Many phosphorescent creatures are found; in certain places «dense forests of pentacrini undulate on the bottom like aquatic plants»; on the submerged banks and in the shallows, coral polyps and mollusks are employed as actively now as ever, in extracting the lime carried in solution by the sea-water, to build its shells and corals which are so large a part of the rock-making material in all this region, from Yucatan to Porto Rico. The most important marine highways for Caribbean commerce are those on the north: the Windward, Anegada, and Mona passages, and the Yucatan Channel. (For the origin of the name, see CARIBS.) Consult: Agassiz, 'The Gulf Stream' (in annual report Smithsonian Inst. to July 1891, Washington 1893); Hill, of United States Geological Survey, 'Cuba and Porto Rico' (1898).

MARRION WILCOX,
Authority on Latin-America.

Caribbee, kăr-ĭ-bē', or **St. Lucia Bark**, a bark sometimes substituted for cinchona (q.v.), though not containing its characteristic alkaloid. It is procured from the *Exostemma Caribæum*, a tree growing in the West Indies. This bark is in convex fragments, covered with a yellow epidermis, and has a very bitter taste and very faint smell.

Caribbee (kăr'ĭ bē) **Islands**, a name commonly given to that portion of the chain of Lesser Antilles between the Virgin and South American groups. See ANTILLES.

Caribe, any of a group of small, robust, voracious fishes, often of singular form, and allied in structure to salmon, which abound in South American tropical rivers. They have numerous teeth, well fitted to biting out pieces of flesh, and instantly seize upon any disabled or soft-bodied creature in the water, and devour it or worry it. Hook-and-line fishing is almost useless where these little bandits are numerous, as they rob the hooks of bait, or tear to pieces anything caught before it can be lifted out of their reach. They will even attack and badly wound human bathers. One of the best known and most dreaded is the piraya of the Amazon, which is said to come in crowds wherever blood is shed in the water. These fishes constitute the subfamily *Serrasalmoninæ*, of the family *Characinidæ*, and are intermediate between the cyprinoids and the salmonoids. A distinguishing characteristic is the fact that the abdomen is serrated with sharp spines.

Caribou, kă-rĭ-boo', the name of two species of reindeer found in Canada. One of these, *Rangifer grœnlandicus*, known as the barren ground caribou, inhabits the barren country in the north of British North America, extending also into Greenland. In color it is reddish-brown above and white below in summer, but the winter coat is whiter and denser. It migrates northward in summer, but on the approach of winter it travels south to the forest country. The other species, the woodland caribou (*R. caribou*), is larger, but has smaller and less branched horns. It inhabits the wooded country to the south of the places frequented by the above species. It is of a general dun-gray color, and the height at the shoulder is about three and a half feet. It is rather shy, and its fleetness enables it readily to distance those in pursuit. Its food consists mainly of lichens, but other vegetable products are also eaten.

Caribou, Maine, town in Aroostook County, 200 miles north of Bangor, on the Canadian P. R.R. It has two banks, a State fish hatchery, court-house, numerous churches and public schools. Its principal products are lumber, starch and potatoes. About 40 per cent of the population is French. Pop. (1900) 4,758.

Car'ica (from Caria, a district of Asia Minor, whence it was supposed to have come), a genus of plants, the typical one of the order of Papayads (*Papayaceæ*). It contains about 10 species, all natives of tropical America. They are small trees without branches, and with large, variously lobed leaves, resembling those of some kinds of palm. They exude an acrid, milky juice when wounded. The most remarkable species is the *C. papaya*, the Papaw-tree, a small tree, seldom above 20 feet high, with a stem about a foot in diameter, tapering gradually to the top, where it is about four or five inches. The fruit is of a dingy orange-yellow color, oblong, about 10 inches long by three or four broad. The ripe fruit is made into sauce or preserved in sugar, and the juice of the unripe fruit is used to remove freckles. The leaves are employed as a substitute for soap. *C. digitata*, a tree which grows in Brazil, where it is called chamburu, is regarded almost with superstitious awe as a deadly poison. For the North American species, see PAPAW.

Caricature and **Caricaturists.** The two great modern cartoonists have been Sir John Tenniel and Thomas Nast, the former being to all Europe what the latter was to all America, and in connection with these two can be said all that need be said of caricaturists of our time. True, Nast was practically alone in his field, and he did not work as long as did Tenniel, still, to judge him at his best, though the period was comparatively short, he stood high as a picture-maker of that class. Nast was as brave as his subject, Tweed, was crooked, and the two furnished the best series of caricatures by far that have ever been seen in this, or, it might be said, in any other country. Nast, however, was not the draughtsman that Tenniel was, but what he lacked in artistic finish, he made up in power and force of expression.

Since the day of Tenniel and Nast, caricaturing seems to have fallen into less virile hands. Tenniel and Nast each drew a caricature once a week, while now caricaturists draw seven or eight in that time. Formerly the best caricaturists were employed on the weekly papers, while now the better class are employed on the great dailies. But the times have brought this about, not necessarily the caricaturists. Workingmen have no time to read, and a picture which may tell all at a glance means more to them than the ablest editorial that the combined editors of the country could write. A picture can be understood by all, whereas we have many languages and we speak but few, and read fewer. Words we forget, but pictures stay, filed away in our minds, and we refer to them

on a moment's notice. Every day, as the pace quickens, and the press for time increases, we find our time for reading diminishes, thus the biograph excels the finest description ever written of the same thing.

We sometimes see so-called comic art, which is not comic, and called caricatures which are not true caricatures. A man who draws a picture of a man with a broad grin and winking with one eye, or cross-eyed, or perhaps a man standing with one foot on his other toe, is not necessarily a caricaturist any more than is the man who puts big feet and big noses on every person he draws. A young caricaturist who had submitted a picture to a critic for his judgment and had received a severe lecture on the bad drawing it displayed, made an attempt to hide behind the fact that it was a caricature, and therefore shouldn't be considered as the critic was considering it. Whereupon he replied: "No, never try to hide behind that. Remember one thing: that poor drawing is not caricature, and another, that all the bad artists in the country are not caricaturists. On the contrary, those who exaggerate the salient features must draw them even better, as more attention is called to a big nose or large ears if they are made conspicuously large, than would be the case otherwise."

But there is something else that a successful caricaturist must possess. That one thing, whatever it may be called, is of more importance than the art of drawing properly, and is a certain force of character, or of individuality which at once suggests strength of purpose and power. It can convey the feeling of sadness, of brute force, or excruciating mirth, yet many very fine draughtsmen who are styled caricaturists, never draw with that spirit predominant, and without it their productions are not true caricatures.

Thus, in trying to be caricaturists, such men are robbed of the chance of being serious illustrators, in which work they might succeed; and they never succeed as caricaturists.

There are three kinds of good caricatures: First, the strong, powerful, almost brutal; second, the humorous, the one instantly compelling laughter; and last, but not the least in effect, the pathetic; a picture capable of causing men to weep. The most effective are the powerful and the pathetic. The humorous is indeed attractive, if not overdone, but you soon forget its meaning. It can attack any and all things, from the weather to the President, without offense. But the most effective caricature is one that the subject of which would rather you would not print. Probably none can be made more powerful than the pathetic when it is timed and tempered just right, as its appeal to the sympathy is the surest way to the emotions. No caricaturist ever drew a caricature that would cause people to shed tears on seeing it, unless the artist shed tears when he drew it, any more than one could draw an angry political boss unless at the time of drawing one wore the same angry and hateful expression on one's own face. So with the humorist. One must wear a broad smile when he draws a man laughing, unless one is drawing him from life; and unless one is smiling when drawing smiling people, the subjects will seem to look and laugh only in mechanical fashion.

If the caricaturist is strong enough in his line to be called one, the first person he wins is himself. Once he has settled in his own mind that he is working for a just cause, it will be noticed at once that his work improves, and if he continues to study and put his heart and soul into it, others will be converted and he will acquire a following. If a cartoonist in his politics keeps side by side with his pictures he will be much more of a caricaturist than one who will work on a Democratic paper one day and the next on the Republican side. A young man in starting out should study and choose for himself and in that way he will find that he can lend more power and force to his work. It would be hard to imagine Thomas Nast being in private life a sympathizer with Tweed. The difficulty with caricaturists is that they are sometimes like the politician after the election, when he says: "No wonder the other side won; 'they bought us.' " What interest could one take outside of the mechanical reproduction if one knew that the caricaturist who had one year drawn powerful caricatures for one party would turn around the next year and work for the opposition. The power of a caricature becomes power only when the reader of the picture is convinced that that which is represented in the picture really did happen, and that cannot be done by a caricaturist if one day he is with the poor, and the next day with the rich; or in the same relation with any case that comes up.

The late John J. Ingalls said that the caricature did harm that good might follow. Caricatures, to be effective, should be founded on fragments of truth, though you are permitted to dig below the frost line. Without truth at the bottom they are powerless, and with truth at the bottom they are powerful and everlasting. Though Tweed, the man, is dead, Tweed, in the caricature, still lives, a prisoner in stripes, with ball and chain to his leg. A good caricature may be called an exaggeration of the truth. In these times there are great opportunities for the cartoonist. The billionaire will have to deal kindly and justly with his fellowmen, or else he will be more of a target than ever before, but the honest man need never fear a caricature; on the contrary, he can laugh and go about his business, and if he is attacked, the attacks will react in his favor. But they cannot be recommended as the steady diet for a dishonest person, since whether he has conscience or not, if they don't bring him to justice they will give him many a sleepless night.

Bibliography.— Flögel, 'Geschichte des Grotesk-Komischen' (1778); Champfleury, 'Histoire général de la caricature' (1865–80); Wright, 'History of Caricature and Grotesque' (1875); Parton, 'Caricature and Other Comic Arts' (1877); Grand Cartaret, 'Les moeurs et la caricature en Allemagne, en Aubriche et en Suisse' (1885); Everitt, 'English Caricaturists of the 19th Century' (1886).

HOMER DAVENPORT,
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Caries, kār'ī-ēz, a form of local death in bone, due to a variety of agents. Caries is usually distinguished from necrosis, another type of local death in bone, by the slower disintegration of the bone affected by the carious process. Necrosis usually results in the death of large pieces of bone, with the formation of sequestra.

Caries is a gradual disintegration without sequestration. Caries is the result of inflammation of the softer tissues in the bone spaces, and is due usually to some definite form of irritant. It may be that of a gas, such as chlorine, or phosphorus, the latter causing in match-workers a form of caries of the jaw; but bacteria of tuberculosis and syphilis are the most frequent causes. Tuberculous caries is the most frequent form of the disease. See HIP JOINT DISEASE; TUBERCULOSIS OF BONE.

For caries of the teeth, see TEETH.

Carigara, kä-rē-gä'ra, Philippines, a town of the province of Leyte, situated on the north coast of the island, 22 miles west of Tacloban. It has a harbor formed by a bight extending 11 miles inland, carries on a considerable coast trade, and is an important hemp port. Pop. 14,000.

Carignano, kä-rēn-yä'nō, Italy, a city in the province of Turin, 11 miles south of the latter on the left bank of the Po. It is surrounded by old walls, and has a handsome square ornamented with arcades, some fine churches, some silk-spinning mills, and sugar-refineries. From this town is named a branch of the house of Savoy. Pop. 7,000.

Carillon, kä-rē-yŏn, a kind of chime, played either by hand or clockwork on a number of bells, forming a complete series or scale of tones or semi-tones, like those of the organ or harpsichord.

Carimata, kä-rē-mä'ta, or **Karimata,** a name applied to the strait between Borneo and Billiton; also to a cluster of a hundred islets and reefs (area, 57 square miles; pop. 500) in that strait; and lastly, to the principal member of the group, whose highest point reaches 2,600 feet.

Carina'tæ, the name given by Merrem to one of the primary divisions of birds, variously ranked as an order (Huxley), a subclass (most modern ornithologists) an intermediate division (Gadow), or split up and distributed (Stejneger). The sternum is provided with a median keel or carina for the attachment of the chief muscles of flight. In a few flightless members, as the dodo, the keel has become abortive, and a few birds not generally recognized as belonging to the *Carinatæ* have keeled sterna, but are distinguished by other characters, such as the possession of a lizard-like tail, or a dromæognathous palate. The vast majority of living birds are carinate.

Carini, kä-rē'nē, Italy, a city in the island of Sicily, 11 miles northwest of Palermo. It is beautifully situated four miles from the sea, in a fertile region. It has a Gothic castle of the 14th century. Fishing is the chief occupation. The district produces much corn and wine. Pop. about 14,000.

Carin'thia (Ger. KÄRNTHEN), a duchy or province of Austria, between lat. 46° 24′ and 47° 7′ N., and lon. 12° 35′ and 15° 10′ E., bounded on the north by Salzburg and Styria, on the east by Styria, on the south by Carniola, and on the west by Italy and Tyrol; area, 3,986 square miles. It is extremely mountainous, generally sterile, and one of the most thinly populated provinces of Austria. The arable land does not exceed 290,000 acres, but there are some fertile valleys, and a considerable extent of rich pasture land. It has several rivers and lakes. Of the former the principal is the Drave. All of them abound with fish. The country does not yield corn enough for the consumption of the inhabitants, who import the deficiency from Hungary. The cereals most extensively cultivated are rye and oats. Some wine is produced in Lower Carinthia, but it is of inferior quality. Cattle, sheep, and horses are raised in considerable numbers, but the mines of Carinthia are the main sources of its wealth. The chief of these are lead, iron, and calamine. Various kinds of gems are met with. Its operative industry is chiefly confined to the working of its metallic ores, though there are also manufactories of woolens, cottons, silk stuffs, etc., most of which are in Klagenfurt, the capital. The principal towns are Klagenfurt and Villach. Carinthia formed part of the empire of Charlemagne, and afterward belonged to the dukes of Friuli. It subsequently passed through various hands, and finally became an appendage of the Austrian crown in 1321. In 1809 it was annexed to the empire of Napoleon, but was restored to Austria in 1814. Nearly all the inhabitants are Roman Catholics. Pop. (1900) 367,344.

Cari'nus, Marcus Aurelius, Roman emperor: d. 285 A.D. He was the elder of the two sons of the Roman emperor Carus, who conjointly succeeded to the throne on the death of their father, 284 A.D. His brother was supposed to have been murdered on his return from the East, and Carinus, ruling alone, became one of the most profligate and cruel of the Roman emperors. The soldiers having rebelled, and proclaimed Diocletian, Carinus collected the troops that were in Italy and marched into Mœsia to meet Diocletian, and quell the revolt. A decisive battle was fought near Margus, in which Carinus gained the victory, but in the moment of triumph he was slain by one of his own officers, whom the vices of the emperor had outraged.

Caripe, kä-rē'pā, Venezuela, a town situated in a valley on the northern part of the province of Bermudez. It was formerly the headquarters of the Capuchins, and contains the ruins of their church cloister. In the vicinity are the large caves, described by Humboldt, in which lives the bird known as guacharo, a kind of nighthawk. Pop. about 4,000.

Carisbrooke, kăr'ĭs-brŭk, England, a village in Hampshire, pleasantly situated at the foot of a hill, near the centre of the Isle of Wight, and overlooked by the ruins of its ancient castle, where Charles I. was imprisoned 13 months, previous to his trial and execution. The castle and grounds cover 20 acres. The parish church of St. Mary is a venerable structure, with a fine tower containing a chime of bells. It was formerly attached to a Benedictine priory founded under William the Conqueror, but the priory no longer exists. In 1859 a Roman villa was discovered at Carisbrooke, and the place seems to have been a fortress at the time of the Roman occupation. Pop. about 9,000.

Carissimi, Giacomo, jä'kō-mō kä-rēs'sē-mē, Italian composer: b. Marino, 1604; d. Rome, 12 Jan. 1674. He became musical director of the church of St. Apollinaris in Rome in 1628, and continued in that position until his death. He wrote many oratorios, cantatas, and

motets, and has been praised for his characteristic expression of feeling, and his easy, flowing style. He deserves most honor for the improvement of the recitative, having given it a more expressive and natural language, and he greatly developed the sacred cantata. His oratorio 'Jonah' has been revived in recent times. It anticipates in the descriptive passages some of the effects since elaborated by the modern classical composers, and it is altogether distinguished by freedom, boldness, and striking antiphonal imitations.

Carita, kä-rē-ta' (Italian from the Latin *caritas,* love), a name, in the fine arts, applied to the representation of Christian love. It is exhibited under the figure of a tender mother, in the midst of her children, manifesting her kindness and affection for them.

Carl, William C., American organist: b. Bloomfield, N. J., 2 March 1865. He is a member of the American Guild of Organists, a director of the Guilmant Organ School, New York, and organist of the First Presbyterian Church there. He has published 'Several Songs and Organ Arrangements' (1892); 'Masterpieces for the Organ' (1898); 'Thirty Postludes for the Organ' (1900).

Carlen, kär-lān', **Emilia Smith Flygare,** Swedish novelist: b. Strömstad, 8 Aug. 1807; d. Stockholm, 5 Feb. 1892. In 1838 she published her first novel, 'Waldemar Klein,' and among the best of her subsequent works are the 'Professor' (1840); 'A Year' (1846); 'The Brother's Bet'; and 'The Guardian' (1851). Several of her novels have been translated into English. In 1827 she married a physician named Flygare, and in 1841, after the death of her first husband, she married J. G. Carlén (q.v.), a lawyer and poet. In 1878 she published a volume of 'Reminiscences of Swedish Literary Life.' She had clear insight into the conditions of human life, especially of life in the middle class, and she describes it with admirable fidelity.

Carlén, Johan Gabriel, yō'hän gä'brē ĕl, Swedish poet and romancer: b. Westgotland, Sweden, 9 July 1814; d. Stockholm, 6 July 1875. He was the second husband of Emilia Carlen (q.v.), and was the author of 'Romanser Svenska Volklifet' ('Romances of Swedish Life') (1840); etc.

Carlén, Rosa, Swedish novelist: b. 1836; d. 1883. Her first story, 'Agnes Tell' (1861), had a very favorable reception. Then followed 'Tuva' (1862); 'Helena, a Woman's History' (1863); 'Three Years and Three Days' (1864); 'The Gypsy's Son' (1866), which is regarded as her most perfect work.

Carles, kär'lās, Philippines, a town of the province of Iloilo, situated on the northeastern point of the island of Panay, in what was formerly the district of Concepcion. Pop. about 10,000.

Carleton, kärl'tŏn, Sir **Guy,** Lord Dorchester, British general: b. Ireland, 3 Sept. 1724; d. Maidenhead, England, 10 Nov. 1808. He distinguished himself at the sieges of Louisburg, Quebec, and Belle Isle, and was wounded in 1762 at the siege of Havana. In 1772 he was made governor of Quebec. On the nomination of Burgoyne to the command, he threw up his commission, but was appointed the same year lieutenant-general, and succeeded Sir Henry Clinton as commander-in-chief in the American colonies.

Carleton, Henry Guy, American journalist and dramatist: b. Fort Union, New Mexico, 21 June 1855. He pursued journalism in New Orleans and New York, and has written several plays, including 'Memnon, a Tragedy'; 'Victor Durand' (presented 1884); and 'The Pembertons' (presented 1890).

Carleton, James Henry, American soldier: b. Maine, 1814; d. San Antonio, Texas, 7 Jan. 1873. In February 1839 he took part in the "Aroostook war," relative to the northeast boundary of the United States, and later was commissioned second lieutenant in the 1st United States Dragoons. In 1846 he took part in Kearny's expedition to the Rocky Mountains, served on Gen. Wool's staff in the Mexican war, receiving the brevet rank of major for gallantry at Buena Vista; and later was chiefly employed in exploring expeditions and against hostile Indians. In 1861 he was ordered to southern California, raised the famous "California column," and marched across the Yuma and Gila deserts to Mesilla on the Rio Grande. As commander of the Department of New Mexico he was active in a number of severe engagements. For his services he was brevetted major-general, 13 March 1865; became lieutenant-colonel of the 4th Cavalry, 31 July 1866; and was promoted colonel of the 2d Cavalry, June 1868, and ordered with his regiment to Texas. He wrote 'The Battle of Buena Vista' (1848).

Carleton, Will, American poet: b. Hudson, Mich., 21 Oct. 1845. He is best known in literature by his ballads of home life, many of them having gained great popularity. His books include 'Poems' (1871); 'Farm Legends' (1875); 'City Ballads' (1888); 'City Legends' (1889); 'City Festivals'; 'Rhymes of Our Planet'; 'The Old Infant, and Similar Stories'; 'Young Folks' Centennial Rhymes.'

Carleton, William, Irish novelist: b. Prillisk, County of Tyrone, 1794; d. Dublin, 30 Jan. 1869. Son of a peasant, he had to endure all the miseries of a poor Irishman's lot. His education commenced at a hedge-school, and terminated with two years' training in an academy at Glasslough. Thence he went to Dublin, with about three shillings in his pocket, and after a little began to support himself by private teaching. He also began writing for the 'Christian Examiner,' and in 1830 published his 'Traits and Stories of the Irish Peasantry.' Popular tastes and critical judgment were both satisfied by the novelty of contents and freshness of style. A second series followed in 1833, and was as universally welcomed. Among later works of his are 'Fardorougha, the Miser' (1839); 'The Misfortunes of Barney Branagan' (1841); 'Valentine M'Clutchy' (1845); 'The Black Prophet' (1847); 'The Tithe Proctor' (1849); 'Willy Reilly' (1855); and 'The Evil Eye' (1860). Ireland has found in Carleton a faithful and fearless exponent of her thoughts and feelings; but outsiders cannot help thinking him somewhat too much of a partisan. He enjoyed a government allowance of £200 per annum several years before his death.

Carleton College, a co-educational institution in Northfield, Minn.; organized in 1866 under the auspices of the Congregational Church. In 1903 it had 14 instructors, 218 students, 17,000 volumes in its library and its property, including endowment, was estimated at $683,777.

Carli, Giovanni Rinaldo, jō-vän'nē rē-näl'-dō kär lē, COUNT, Italian writer: b. Capo d'Istria, 11 April 1720; d. 22 Feb. 1795. He was of an ancient, noble family, and early manifested an inclination for the study of the Middle Ages, with which he connected the study of belles-lettres and of poetry. In his 24th year the senate of Venice made him professor of astronomy and naval science. The care which his large estates required compelled Carli to resign his professorship and retire to Istria, where he spent his time in the study of antiquities, on which he wrote some valuable treatises. He was afterward appointed by the emperor president of the highest commercial court at Milan, and subsequently president of the College of Finance in the same city. He published his works (1784–94) in 15 volumes, under the title 'Opere del Sig. Commendatore D. Gian Rinaldo, Conte Carli, Presidente,' etc., but this edition does not include his 'Delle Monete' (1754–60); and 'Delle Antichità Italiche' (1788–91).

Car'lin, Thomas, American politician: b. Kentucky, 1790; d. 2 Feb. 1852. He removed to Illinois in 1813, and gradually accumulated wealth, and became known and respected among the scattered population about him. He was elected governor in 1838, and retained that office for four years, during a period of unusual and violent political excitement. Illinois, having engaged largely in internal improvements, suffered severely from the commercial revulsion which was then paralyzing the whole country. She was much in debt, and had within her borders no specie, and no available means of payment. The discussion of the slavery question, too, was then furious, and had just led to the tragic death of E. P. Lovejoy. At the same time the Mormons took up their position at Nauvoo, and politicians were beginning those movements for partisan ends which seemed likely to throw the State into anarchy, and which ended ere long in the violent death of the Mormon leader. That Gov. Carlin, amid such a condition of affairs, was three times re-elected to the chief magistracy, affords a sure indication both of his popularity and his force of character.

Carline Thistle. See THISTLE.

Car'linville, Ill., a city and county-seat of Macoupin County, 60 miles southwest of Springfield; on the Chicago & Alton, and other railroads. It has a prosperous local trade and manufactures of bricks and tiles, agricultural implements, etc. There are coal-mines in the vicinity. It is the seat of Blackburn University, a Presbyterian institution. Its court-house is considered one of the finest public buildings in the State. Pop. (1900) 3,502.

Carlisle, kär līl', **George William Frederic Howard,** 7th earl, b. 18 April 1802; d. 4 Dec. 1864. He became earl 7 Oct. 1848, previous to which, as Lord Morpeth, he had traveled extensively in the United States. He was a long time attaché to the British embassy at St. Petersburg. In the reformed House of Commons he represented the West Riding of Yorkshire, and under the Melbourne ministry was secretary of state for Ireland. In 1841 he was defeated in the West Riding by his Conservative opponents. In 1846, under the administration of Lord John Russell, he was appointed commissioner of woods and forests, and chancellor of the duchy of Lancaster. He was the first of the Whig noblemen of the official class to give in his adhesion to the views of the Anti-Corn Law League. In 1856 he delivered before the Mechanics' Institute at Leeds two lectures, since published, on the life and writings of Pope, and on the United States. Previous to the Crimean war, he made a tour in the east of Europe, and published his 'Diary in Turkish and Greek Waters.' On the accession of Lord Palmerston in 1855, he was nominated lord lieutenant of Ireland, which office he held till the resignation of the Palmerston ministry in 1858. A work by him entitled 'The Second Vision of Daniel' was published in 1858.

Carlisle, John Griffin, American statesman: b. Kenton County, Ky., 5 Sept. 1835. He received a common-school education, studied law, and was admitted to the bar in 1858. He served several terms in the lower house of the State legislature. During the Civil War he actively opposed secession, and in 1866 and 1869 was a member of the State senate. He was lieutenant-governor of Kentucky, 1871–5; was elected to Congress, 1876, and five times re-elected. His ability soon made him one of the Democratic leaders. In the 48th, 49th, and 50th congresses he was chosen speaker. In 1890 he was elected United States senator, but resigned in March 1893, to accept the portfolio of secretary of the treasury in President Cleveland's Cabinet. At the close of his term he settled in New York to practise law.

Carlisle, England, city and capital of Cumberlandshire; at the confluence of the Caldew and Eden rivers. It has steamboat and railroad communications with Liverpool, Belfast, etc. Ginghams, cotton checks, etc., are its chief manufactures. Its most noted building is a cathedral founded by William Rufus. It lost its nave, with the exception of the two eastern bays, during the civil war, but the choir, 138 feet long, is very beautiful and contains an east window, by many judges esteemed the finest in England. There is also a castle, founded in 1092. Carlisle was the ancient capital of the kings of Cumbria, and was sacked by the Danes in 900. During the English and Scotch border-wars it was frequently besieged. It was here that Buccleuch rescued Kinmont Willie. During the civil war the town twice surrendered to the Parliamentarians (1645 and 1648). Pop. (1901) 45,000. See Creighton, 'Carlisle' in 'Historic Towns' series (1889).

Carlisle, Pa., borough and county-seat of Cumberland County, on the Cumberland V., and the Gettysburg & H. R.R.'s; 18 miles west of Harrisburg. It is the farming and manufacturing trade centre of Cumberland County, and is the site of Dickinson College, founded 1783, Metzger Female College, and the United States Indian Training School. It has a national bank, large manufacturing establishments, Hamilton Library, Todd Hospital, and an assessed

property valuation of $3,000,000. It was the headquarters of Washington during the Whisky Rebellion in 1794, and was bombarded by the Confederates in 1863. Pop. (1900) 9,626.

Carlisle Indian School. See UNITED STATES INDIAN TRAINING AND INDUSTRIAL SCHOOL.

Carl'ists, a Spanish political faction which advocates the claims of Carlos of Bourbon and his descendants to the Spanish throne. In 1833 the Carlists, whose chief strength lay in the Basque provinces, and who, because of their Catholic traditions and tendencies, were secretly favored by the Pope and the eastern powers, raised the standard of revolt. They had the advantage until 1836, when Espartero inflicted on them a terrific defeat at Luchana. In August 1839 their commander, Maroto, treacherously made peace, and the remaining Carlists soon fled to France. In 1873 the grandson of the first pretender raised another revolt in the Basque provinces of Navarre and Biscay, but after several sharp conflicts the rebels were hemmed in along the north coast, and in 1876 the pretender and his chief supporters fled into France.

Carll, John Franklin, American geologist: b. Long Island, N. Y., 7 May 1828. He became identified with coal oil development early in life, and has perfected many oil-pumping devices. Since 1874 he has been connected with the Pennsylvania Geological Survey.

Carlone, kär-lō'nā, the name of an Italian family of distinguished artists, who flourished chiefly in the 17th and 18th centuries. The most celebrated of them are: 1. TADDEO, a native of Lombardy, who excelled in sculpture, and was employed, along with his brother Joseph, by the courts of England, Spain, and Mantua; d. 1613. 2. GIOVANNI, eldest son of Taddeo: b. Genoa, 1590; d. 1630. He made great progress in painting under the tuition of his father and Peter Sorri, and, having afterward studied under Passignano, distinguished himself particularly by his frescoes, in which the freedom and spirit of his design, the depth of his expression, grandeur of his conception, and the richness of his coloring are particularly admired. 3. GIOVANNI BATTISTA, brother of the former: b. Genoa, 1598; d. 1659 or 1680. He was also a scholar of Passignano, and painted with his brother, whose style he followed so exactly that it is difficult to distinguish their pictures. He ultimately entered the service of the Duke of Savoy. He excelled particularly in frescoes, which are so soft, fresh, and uniform that they resemble oil paintings. 4. ANDREA, son of Giovanni Battista: b. 1627; d. 1697. He rose to great eminence as a painter. He took chiefly for his models Titian, Veronese, and Tintoretto, and founded a school of painting in Perugia.

Carlos de Bourbon, DON MARIA ISIDOR, mä-rē'ä ēs'ẹ-dôr, second son of Charles IV. of Spain and brother of Ferdinand VII.: b. 29 March 1788; d. Trieste, 10 March 1855. In 1808 he was compelled by Napoleon along with his brother, who had now succeeded to the throne, to renounce all claims to the succession, and was detained with Ferdinand in captivity at Valençay in France till 1814. In 1816 he married Maria Francisca d'Assis, daughter of John VI. of Portugal, his brother the king of Spain having at the same time espoused another daughter of John as his second wife. This last marriage, like Ferdinand's first, having turned out unproductive of issue, a prospect opened to Don Carlos of succeeding to the crown, which almost assumed the shape of absolute certainty when a third marriage contracted by Ferdinand proved equally unsuccessful with the two former in producing an heir to the Spanish monarchy. On the death of Ferdinand's third wife in 1829 he again married, and, by a pragmatic sanction, the contingency of a female heir was provided for by the repeal of the Salic law, which excluded such from the throne. On 10 Oct. 1830, Maria Isabella, afterward queen of Spain, was born. In 1832 Don Carlos' party succeeded by taking advantage of the king's imbecile condition to obtain a repeal of the pragmatic sanction; but this advantage was only temporary, as Ferdinand disowned his act on recovering the use of his reason. The following year Don Carlos was exiled with his wife to Portugal; and having refused to return from thence to be present at the taking of the oath of allegiance to the young queen, he was commanded by Ferdinand to retire to the Papal States. On 29 Sept. 1833 Ferdinand VII. died, and a few days afterward his consort the queen-regent repeated the order to his brother to quit the country. The latter, however, now announced himself as legitimate king of Spain, and was recognized as such by a considerable party who excited a civil war in his favor, and thenceforward were designated by the title of Carlists. After a course of hostilities extending over several years with varying success, he found himself obliged in 1839 to take shelter in France. In the meantime he and his descendants had been formally excluded from the succession by a vote of the Cortes in 1836. On arriving in France the castle of Bourges was assigned him as a residence, and he was also detained a prisoner there for a considerable time owing to his refusal to make the renunciations demanded of him. In 1845 he resigned his claims in favor of his eldest son, and in 1847 was permitted to take up his abode in Trieste, where he died.

Carlos, Don, dŏn kär'lōs, Infant of Spain, son of Philip II. and Maria of Portugal: b. Valladolid, 8 July 1545; d. 1568. He was sickly, and one of his legs was shorter than the other. The extreme indulgence with which he was educated by Joan, sister of the king, confirmed his violent, obstinate, and vindictive disposition. In 1560 Philip caused him to be acknowledged heir of the throne by the estates assembled at Toledo, and in 1562 he sent him to the University of Alcala de Henares in hopes that the study of the sciences would soften his turbulent character. Contemporary historians differ in the description of the prince. According to some he had a thirst for glory, an elevated courage, pride, and a love of power. According to others he was fond of whatever was strange and uncommon; an accident or opposition irritated him to frenzy; address and submission softened him. He is also represented as a favorer of the insurgents in the Netherlands, and in particular as an enemy of the Inquisition; yet he possessed neither knowledge nor principles, nor even sufficient understanding to be capable of liberal views. With him all was passionate excitement, which resistance converted into fury. Llorente has corrected the

accounts of the character and fate of this prince from authentic sources in his work on the Spanish Inquisition (q.v.). According to him Don Carlos was arrogant, brutal, ignorant, and ill-educated. This much is certain, that at the Congress of Cateau Cambrésis (1559) the marriage of Don Carlos with Elizabeth, daughter of Henry II. of France, was proposed; but Philip, being left a widower by the death of Mary of England, took the place of his son. Don Carlos is said to have loved Elizabeth, and to have never forgiven his father for having deprived him of her. Llorente proves, however, that Don Carlos never had fallen in love with the queen, and that she was never too intimate with him. In 1563 Philip, who had no other heir than Don Carlos, considering him unfit for the throne, sent for his nephews, the archdukes Rodolph and Ernestus, to secure to them the succession to his dominions. Don Carlos, who lived in continual misunderstanding with his father, resolved in 1565 to leave Spain, and was on the point of embarking when Ruy Gomez de Silva, a confidant both of Philip and Carlos, dissuaded him from his resolution. In 1567, when the rebellion in the Low Countries disquieted Philip, Don Carlos wrote to several grandees of the kingdom that he had the intention of going to Germany. He disclosed his plan to his uncle, Don John of Austria, who told Philip what Don Carlos had confided to him. It is believed that he was touched by the sufferings of the people of the Netherlands. Philip himself seemed to believe that his son intended to go to the Netherlands. The infant had often shown a vehement desire to participate in the government. But Philip, jealous of his own authority, treated his son coolly and with reserve, while he gave his confidence to the Duke of Alva, to Ruy Gomez de Silva, Don Juan of Austria, and Spinola. Don Carlos conceived an invincible aversion to them. The architect of the Escurial, Louis de Foix, narrates the following story relating to Don Carlos, which has been preserved to us by De Thou. The prince had always under his pillow two naked swords, two loaded pistols, and at the side of his bed several guns, and a chest full of other firearms. He was often heard to complain that his father had deprived him of his bride. On Christmas evening he confessed to a priest that he had resolved to murder a man. The priest, therefore, refused him absolution. The prior of the monastery of Atocha artfully drew from him expressions from which it could be inferred that he meditated an attempt upon his own father. The story was then communicated to the king, who exclaimed, "I am the man whom my son intends to murder; but I shall take measures to prevent it." Thus Philip, impelled by hatred or fear, by policy or superstition, resolved on the destruction of his only son, in whom he saw only a criminal, unworthy of the crown. On the night of 18 Jan. 1568 while Don Carlos was buried in a deep sleep, Count Lerma entered his chamber and removed his arms. Then appeared the king, preceded by Ruy Gomez de Silva, the Duke of Feria, the grand prior of the order of St. John, brother of the Duke of Alva, and several officers of the guard, and state councilors. Don Carlos still slept. They awoke him: he beheld the king his father, and exclaimed, "I am a dead man." Then, addressing Philip, he said, "Does your majesty wish to kill me? I am not mad, but reduced to despair by my sufferings." He conjured with tears those who were present to put him to death. "I am not come," answered the king, "to put you to death, but to punish you as a father, and to bring you back to your duty." He then commanded him to rise, deprived him of his domestics, ordered a box of papers under his bed to be seized, and committed him to the care of the Duke of Feria and six noblemen, enjoining them not to permit him to write nor to speak with any one. These guards clothed Don Carlos in a mourning dress, took from his chamber the tapestry, the furniture, and even his bed. Don Carlos, full of rage and despair, caused a large fire to be kindled, under pretext of the extreme cold of the winter, and threw himself suddenly into the flames. It was with difficulty that he was rescued. He attempted by turns to finish his life by thirst, by hunger, by eating to excess. After Philip had endeavored to justify his measures to the Pope and the principal sovereigns of Europe, and had also given notice to the superior clergy, the courts of justice, and the cities of his empire, of what had passed, he referred the case of the prince, not to the Inquisition, but to the council of state, under the direction of Cardinal Espinosa, who was state councilor, grand inquisitor, and president of the junta of Castile. This court is said, after a minute examination and hearing many witnesses, to have condemned him to death. Other accounts, however, state that he died of a malignant fever before any judgment was passed, after having taken the sacrament with much devotion, and having asked his father's pardon, 24 July 1568. The melancholy fate of Don Carlos has served as a subject for several tragedies — those of Schiller, Alfieri, Otway, and Campistron.

Carlos, Don, COUNT DE MONTEMOLIN, son of Carlos de Bourbon (q.v.): b. 31 Jan. 1818; d. Trieste, 1861. He was long resident in London, and in 1850 married Maria Carolina Ferdinanda, a sister of Ferdinand II., king of Naples. On more than one occasion he endeavored to excite an insurrection in his favor in his native country, but these attempts were always frustrated. In 1860, when he made his last venture, he and his army were taken prisoners by the troops of Isabella. The rebel general was shot, and Don Carlos liberated only on condition of solemnly renouncing all claims to the crown — an act which he repudiated when he got out of the hands of his enemies.

Carlota, kär-lō'ṭa, Philippines, (1) a town of Negros Occidental, situated in the western part of the island of Negros, 20 miles south of Bacolod. Pop. 12,004. (2) A town in the eastern part of the island of Negros (Negros Oriental), where the insular government owns a plantation of 2,000 acres. Pop. 6,386.

Carlot'ta (MARIE CARLOTTA AMELIE), empress of Mexico: b. near Brussels, 7 June 1840. She was the daughter of Leopold I., king of Belgium, and married Maximilian, Archduke of Austria, 27 June 1857. In 1864 she went with her husband to Mexico and remained there till 1866, when the dissatisfaction against the empire forced her husband to send her to ask help from France. She could obtain no assistance from Napoleon III. and went to Rome

to appeal to the Pope. Before negotiations there were completed, her health gave way under the strain, and after the end of the empire and the execution of her husband she became totally insane. She was taken to the Château de Bouchoute, near Brussels, Belgium, where she lives, an incurable invalid.

Carlovin'gians, the second dynasty of the French or Frankish kings, which supplanted the Merovingians, deriving the name from Charles Martel or his grandson Charlemagne (that is, Karl or Charles the Great). Its origin is usually traced to Arnulph, a bishop of Metz, who died in 631. Charles Martel became mayor of the palace in 714 to the Merovingian *roi fainéant* Childeric, and in this office was succeeded by his son Pepin le Bref, who in 752 deposed the merely nominal king and himself assumed that title. He was succeeded by Charlemagne and his brother Carloman (768–771). Charlemagne became sole king in 771, and extended greatly the dominions of the family. In 800 Leo III. crowned him emperor of the west. On his death in 814 he was succeeded by his son Louis le Débonnaire. He divided his empire among his sons, and at his death, in 840, his son Charles the Bald became king of France. He died in 877, and was succeeded by a number of feeble princes. The dynasty came to an end with Louis V., who died in 987. The house of Capet followed it.

Carlovitz, or **Carlowitz.** See KARLOWITZ.

Carlow, kär-low, Ireland, an inland county in the province of Leinster, surrounded by Kildare, Wicklow, Wexford, Kilkenny, and Queen's County. It is generally level or undulating except in the southeastern parts. The chief rivers are the Slaney and Barrow. From the remarkable fertility of its soil it is altogether an agricultural county, producing a great deal of butter, corn, flour, and other agricultural produce for exportation. Agriculture is here carried on with as much skill and knowledge of recent improvements as anywhere in Ireland, and there is less poverty than in most parts. Area 353 square miles. Pop. (1901) 37,723.

Carlow, Ireland, a town of the county of Carlow, on the Barrow, 34 miles southwest of Dublin, with which it is connected by railway and canal. It has two principal streets intersecting at right angles. A bridge of five arches leads over the Barrow to the suburban village of Graigue, in Queen's County. The principal public buildings are the Roman Catholic cathedral and college, three convents, barracks, a lunatic asylum, a court-house, town-hall, union workhouse, an infirmary, and a fever hospital. It is lighted by electricity, and has an excellent water-supply. Carlow is the principal mart for the agricultural produce of the surrounding country, and carries on an extensive trade in corn, malt, butter, etc. On rising ground to the south stand the ruins of the ancient castle of Carlow, still presenting a very imposing appearance. Pop. (1901) 7,200.

Carlsbad, kärls'bät, Bohemia, a town on the Tepl, near its influx to the Eger, 116 miles west by north of Prague. It is widely celebrated for its hot mineral springs, and is frequented in summer by visitors of the most aristocratic character from all parts of Europe. In the season, April to October, the visitors number from 25,000 to 30,000. Set in most lovely scenery, the town is well built, and offers good accommodation for its guests. The temperature of the hot springs varies from 117° to 167° F. The principal spring, the Sprudel, has a very large volume, and is forced up to a height of three feet from the ground. Altogether, the daily flow of the springs of Carlsbad is estimated at 2,000,000 gallons. The principal ingredient in the water is sulphate of soda. The whole town of Carlsbad appears to stand on a vast caldron of boiling water, which is kept from bursting only by the safety-valves the springs provide. Ascribing its foundation to the Emperor Charles IV. (1347), Carlsbad was made a free town by Joseph I. Pop. (1903) about 15,000.

Carlsbad, Congress of, a conference of ministers representing Austria, Prussia, and many small German states, which met at Carlsbad in August 1819 to discuss the democratic tendencies then manifesting themselves in Germany. Its members recommended to their governments and to the German Diet, the famous 'Carlsbad Decrees,' which were adopted by the Diet, 20 Sept. 1819. Among the most important of the decrees were those recommending severe press censorship, the establishment at Mainz of a central commission for the investigation of political intrigues, the suppression of the secret student organization, the Burschenshaft, and government inspection of the universities.

Carlsburg, kärls'boorg, or **Karlsburg,** Austro-Hungary, a town (ancient Apulum) on the right bank of the Maros, 33 miles northwest of Hermannstadt. It consists of an upper and a lower town, situated on opposite sides of the river, and communicating by a long bridge. It is defended by a citadel, and has a cathedral with a number of ancient monuments, a mint where the gold and silver obtained in Transylvania are purified and coined, an observatory with a good collection of instruments, an excellent library, a theological college, a gymnasium, normal school, arsenal, and barracks. Pop. 8,000.

Carlscrona, kärls'krō-na, or **Karlskrona** ("Charles' Crown"), Sweden, a seaport at the southern extremity of the peninsula, on the Baltic, capital of the län or province of Blekinge or Carlscrona. It stands on several rocky islets connected with one another and with the mainland by bridges, has broad, clean, but somewhat steep streets, with houses mostly built of wood. The harbor is safe and spacious, the entrance protected by forts. It was founded by Charles XII. in 1680. As the chief Swedish naval station the town largely depends on the trade thereby occasioned, but it has also a considerable export trade in timber, tar, potash, tallow, etc. Pop. (1900) 23,955.

Carlsen, Emil, American artist: b. Denmark, 1848. He came to the United States in 1872 and studied art in Boston. Since 1891 he has lived in New York and has exhibited frequently there. His especial field is still life painting, but he is also favorably known as a landscape artist.

Carlshamn, kärls'häm ("Charles' Haven"), Sweden, a seaport town, 27 miles west of Carlscrona, in a beautiful valley at the mouth of the Mie-A. It is regularly built, and its

square market-place, planted on all sides with trees, has a fine appearance. It has an elegant town-house, a good harbor, and an active trade. Timber and articles of timber constitute the chief exports. The manufactures are sail-cloth, sacking, tobacco, leather, etc.; and there is also some ship-building. Pop. (1890) 7,191.

Carlson, kärl'sŏn, **Fredrik Ferdinand,** Swedish historian: b. Upland, 13 June 1811; d. Stockholm, 18 March 1887. He was prominent in public matters for many years, being minister of ecclesiastical affairs, 1863–70, and again, 1875–8. He wrote, among other works, a 'History of Sweden' (1855–87), which ranks high because of its exhaustive accuracy and literary merit.

Carlsruhe, kärls'roo-ŭ, or **Karlsruhe** ("Charles' Rest"), Germany, the capital of the grand-duchy of Baden. It was laid out in 1715, and is one of the most regularly built towns in Europe. The castle of the grand-duke stands in the centre of the city, and from this point a number of streets radiate fan fashion, at regular distances from each other. Other streets intersect these in parallel circles. The roads leading to the city correspond to this regular disposition, which, as is apt to be the case in strictly regular cities, often leaves upon the traveler the impression of monotony rather than that of agreeable order. The city is ornamented with several beautiful public buildings, including the palace, in front of which is a bronze statue of the founder of the city, the margrave, Charles William, the parliament house, town hall, etc. The court library contains 150,000 volumes; there are also here several valuable museums and cabinets, a botanic garden, several institutions for the promotion of literature and the fine arts, and sundry industrial establishments, such as a foundry and electro-plating work, an engine factory, carriage works, etc. Pop. (1900) 97,164.

Carlstad, kärl städ, Sweden, a town and the capital of the län of the same name, on an island in Lake Wener formed by the two mouths of the Klar, and connected with the mainland by a bridge across either stream. It is beautifully situated, regularly built, is the seat of a bishop, and has a cathedral, gymnasium, town-house, etc., and some trade in copper, timber, iron, and grain. Pop. (1900) 11,869.

Carlstadt, Andreas Rudolf, än'drā ās roo dŏlf kärl'stät, **Bodenstein,** German theologian: b. Carlstadt, Franconia, 1480; d. Basel, Switzerland, 25 Dec. 1541. He is celebrated in the history of the Reformation for his fanaticism as well as his misfortunes. He was appointed professor of theology at Wittenberg in 1513. His learning enabled him to render great support to Luther in his first steps for the introduction of a reformation. In 1520 he was included in the bull which condemned Luther; and his spirited appeal from the Pope to a general council, of which he gave the first example, as well as his opinion, openly expressed, in favor of the marriage of the priesthood, which soon gained ground, was among the many proofs which he gave of his zeal for the Reformation. While Luther was at Wartburg Carlstadt's zeal urged him to acts of violence. He even instigated the people and students to the destruction of the altars and the images of the saints, greatly to the displeasure of Luther, who lost the friendship of Carlstadt by his opposition to his excesses. In 1524 he publicly declared himself the opponent of Luther, and the Elector Frederick banished him from the country in September 1524. Carlstadt upon this commenced the controversy respecting the sacrament, denying, in opposition to Luther, the bodily presence of Christ in the sacramental elements, and recognizing in the rite a token of remembrance simply. This controversy was carried on with the bitterest animosity; and Zwinglius having declared himself in favor of Carlstadt's doctrine, a dispute ensued between the Swiss and Wittenberg theologians, which ended in the separation of the Calvinists and Lutherans. Carlstadt in the meantime, being suspected, not without reason, of having taken part in the revolt of the peasants in Franconia, was obliged to wander through Germany, and being ultimately reduced to extreme distress, sought relief of Luther, who procured him an asylum at Kemberg, on condition that he should refrain from the expression of his opinions. Here he lived nearly three years. His restless mind, however, soon led him to break his promise, by the publication of some writings in 1528; and he even went so far as to plot against Luther's person. To escape from the consequences of his conduct he repaired to Switzerland at the end of the same year, where he was appointed vicar of Altstadt, in the valley of the Rhine; in 1530, deacon at Zürich; and in 1534, vicar and professor of theology at Basel.

Carlstadt, Austria, a town in Croatia, 34 miles southwest of Agram, agreeably situated in a perfectly level and richlv cultivated plain near the junction of the Kulpa, Korana, and Dobra, which are here navigable. It consists of the town proper and the citadel, together with the suburb of Dubovacz. It is the seat of a Greek bishopric, is tolerably well built, and has an important trade. Pop. (1890) 5,559.

Carl'ton, Charles, Anglo-American educator: b. Eythorne, Kent, England, 21 Aug. 1821; d. Bonham, Texas, 13 Feb. 1902. He removed to Toronto, Ontario, spent several years as a seaman and subsequently while working on a farm at Fredonia, N. Y., studied for the ministry, and was graduated from Bethany College, W. Va., in 1849. He was successively pastor in Georgetown, Ky.; Lexington, Mo.; Little Rock and Van Buren, Ark., and in 1867 removed to Bonham which continued his home for the rest of his life. There he established a co-educational school called Bonham Seminary, which in 1882 changed its name to Carlton College and became an institution for women solely. He was a prominent leader in the Christian denomination in Texas.

Carlyle, kär-lil', **Alexander,** Scottish clergyman: b. Prestonpans, 26 Jan. 1722; d. Inveresk, 25 Aug. 1805. He was educated at the universities of Edinburgh and Glasgow, and afterward studied at the University of Leyden. Having been licensed as a preacher, in 1747 he was presented to the parish of Inveresk, in Mid Lothian, where he continued to the end of his life. He was one of the leaders of the Moderate party in the Scottish Church, the party which, during the latter half of the 18th century, ruled with such predominating sway, and included the names of Robertson, Blair, and Home among its members. As an eloquent debater and skilful

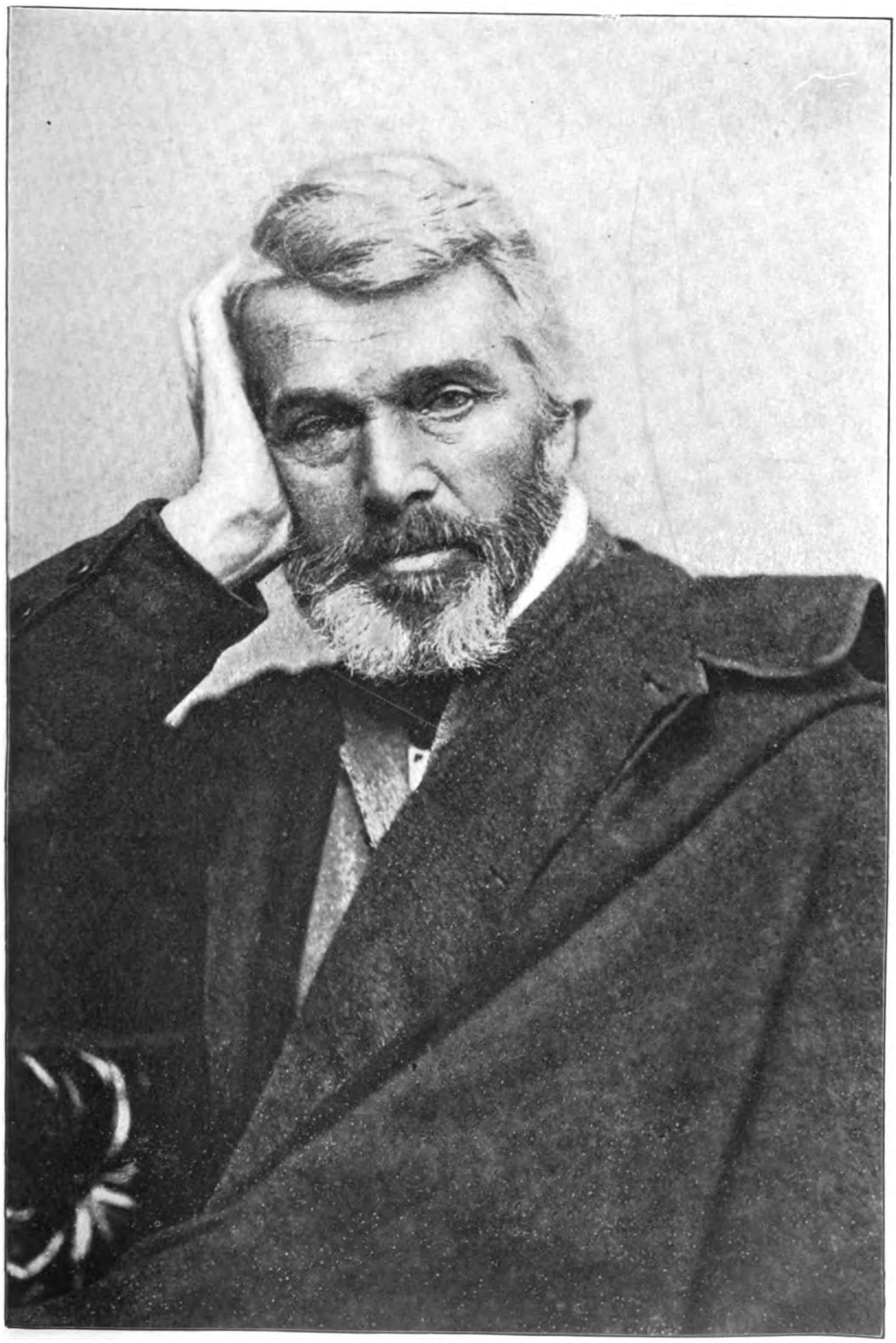
ecclesiastical leader in the General Assembly he had no rival. He strenuously resisted all attempts to give additional influence to the popular element in ecclesiastical matters. He left behind him a well-known autobiography, which, though commenced in his 79th year, is a singularly interesting production, both from the vigor and sprightliness of its style, and the pictures which it presents of Scottish society in the 18th century. After remaining long in manuscript it was published in 1860, under the editorship of John Hill Burton.

Carlyle, Jane Baillie Welsh, Scottish letter writer: b. Haddington, Scotland, 14 July 1801; d. London, 21 April 1866. She was the daughter of John Welsh, a Haddington surgeon, and was married to Thomas Carlyle (q.v.) 17 Oct. 1826. Her letters, edited by her husband, were published in 1883.

Carlyle, Thomas, Scottish critic and historian: b. Ecclefechan, Dumfriesshire, 4 Dec. 1795; d. Chelsea, London, 5 Feb. 1881. He was the eldest son of James Carlyle, a mason and afterward a farmer. James Carlyle was a serious, God-fearing man of great intellectual power, while his wife, Margaret Aitken, is represented to have been affectionate, pious, and intelligent. The elder Carlyle was a member of the dissenting body known as the Relief Church, and intended his son Thomas for a minister of this church, with which object he was carefully educated at the parish school and afterward at the burgh school of Annan. When only in his 15th year he was sent to the University of Edinburgh, where he studied under such professors as Leslie, Playfair, and Dr. Thomas Brown. Here he developed a strong taste for mathematics, a study in which he attained great proficiency. Having renounced the idea of becoming a minister, after finishing his curriculum in 1814, he became a teacher for about four years, first at Annan, afterward at Kirkcaldy, where he conducted the burgh school, and left behind him the character of an over-stern disciplinarian. At the latter place the celebrated Edward Irving (q.v.), whom he had first met during his school-boy days at Annan, was then also acting as a teacher, and the two became intimate friends. In 1818 he removed to Edinburgh, where he supported himself by literary work, devoted much time to the study of German, and went through a varied and extensive course of reading in history, poetry, romance, and other fields. His first literary productions were short biographies and other articles for the Edinburgh 'Encyclopædia,' an extensive work edited by Brewster. After three years of hard work and poverty in Edinburgh his health broke down, and he retired for a time to his father's farm in Dumfriesshire. He was next engaged to act as tutor to the sons of Mr. Buller, one of whom was afterward honorably known in public life. This post he held for about two years.

During this period his career as an author may be said to have really begun, with the issue in monthly portions of his 'Life of Schiller' in the London 'Magazine,' in 1823, this work being enlarged and published separately in 1825. In 1824 he published a translation of Legendre's Geometry, with an essay on proportion, by himself, prefixed, which Prof. De Morgan characterized as "thoughtful and ingenious, as good a substitute for the fifth book of Euclid as could have been given in the space." The same year appeared his translation of Goethe's 'Wilhelm Meister's Apprenticeship.' This work, which like the others mentioned, was anonymous, was on the whole favorably received, though some critics objected to the translator's too great fondness for German idioms. During his tutorship he stayed some time in London, where Irving then was. He was next engaged in translating specimens of the German romance writers, published 1827. In 1826 he married Miss Jane Welsh, daughter of a doctor at Haddington, and a lineal descendant of John Knox. After his marriage he resided for a time in Edinburgh, and then withdrew to a farm in Dumfriesshire belonging to his wife, about 15 miles from the town of Dumfries. This place, Craigenputtock, he describes in a letter to Goethe, in 1828, as "the loneliest nook in Britain, an oasis in a wilderness of heath and rock, among the granite hills and the black morasses which stretch westward through Galloway almost to the Irish Sea." Here he wrote a number of critical and biographical articles for various periodicals, such as the 'Edinburgh Review,' the 'Foreign Quarterly,' and 'Fraser's Magazine'; and here was written 'Sartor Resartus,' the most original of his works, the one which first brought him fame, and which has had perhaps a greater influence on the minds of readers than any single work that could be named. The writing of 'Sartor Resartus' occupied portions of several years. It seems to have been finished in 1831, but the publishers were shy of it, and it was not given to the public till 1833–4, through the medium of 'Fraser's Magazine.' The whimsical title of this work (literally 'The Tailor Repatched') is a translation of that of an old Scottish song ('The Tailor Done Over'). The book professes to be an exposition for English readers of a new philosophy, the philosophy of clothes, first thought out and expounded by Diogenes Teufelsdröckh (Devil's Dirt, Asafœtida), professor of things in general in the German university town of Weissnichtwo (Know-not-where, Scotch Kennaquhair); with biographical particulars regarding the professor, and miscellaneous thoughts, reflections, and speculations of his not strictly connected with his philosophy. The professor of course is really Carlyle himself, and the work is to some extent autobiographical. It is inspired by a distinctly didactic purpose, preaching through its wonderful intermixture of the humorous, the grotesque, the sublime, the pathetic, the solemn, the profound, welded together by a poetic or even a prophetic spirit, the doctrines of truthfulness, obedience, duty, work, and, above all, hatred of sham.

The publication of 'Sartor' (to which no author's name was originally attached) soon made Carlyle famous, and on his removal to London early in 1834 he became a prominent member of a brilliant literary circle embracing John Stuart Mill, Leigh Hunt, John Sterling, Julius Charles, and Augustus William Hare, Maurice, and his old pupil Charles Buller. He fixed his abode at Cheyne Row, Chelsea, where his life henceforth was mainly spent. His next work of importance was on the French Revolution, published in 1837. This, though a work of immense research, is hardly a history in the ordinary sense of the term; it is rather a series



THOMAS CARLYLE.

Mau

of powerful pictures, in which we see taking place the chief events and are made intimately acquainted with the chief actors of that stormy period. Of it the 'Westminster Review' remarked, "No work of greater genius, either historical or poetical, has been produced in this country for many years." The first volume of the 'French Revolution,' while still only in MS., was unfortunately burned while in John S. Mill's possession, and the author had immediately to set to work and write it over again. About this time, and on one or two subsequent years, he delivered several series of lectures, the most important of these, 'On Heroes and Hero-worship,' being published in 1840. 'Chartism,' published in 1839, and 'Past and Present,' in 1843, were small works bearing more or less on the affairs of the time. In 1845 appeared his 'Oliver Cromwell's Letters and Speeches, with Elucidations,' a work of great research, and brilliantly successful in vindicating the character of the great Protector. In 1850 came out his 'Latter-day Pamphlets,' a series of tracts dealing with political subjects, and assailing with extraordinary vehemence, not to say virulence, the most prominent institutions and characteristics of modern England and its people. This work was very repulsive to many from the exaggeration of its language, and its advocacy of harsh and coercive measures. He next wrote a life of his friend John Sterling, published in 1851, and regarded as a finished and artistic performance.

The largest and most laborious work of his life, 'The History of Friedrich II. of Prussia, called Frederick the Great,' next appeared, the first two volumes in 1858, the second two in 1862, and the last two in 1865, and after this time little came from his pen. His choice of Frederick as a hero strikes most people as a little remarkable, a feeling that the author was himself prepared for. He gives as his reasons for selecting him for historical treatment that he was the man that did almost the only real and substantial work in his century; that there was nothing of the hypocrite or sham about him; and that "How this man, officially a king withal, comported himself in the eighteenth century, and managed *not* to be a liar and charlatan as his century was, deserves to be seen a little by men and kings, and may silently have didactic meanings in it." He is reported to have said in conversation that he had tried to put a little humanity into Frederick, but found it hard work. Of the immense labor and research shown in this work, of the descriptive and narrative power displayed on almost every page, of the vividness with which a portrait is drawn, or an event put before us, it is almost impossible to speak too highly. At the same time it can hardly be denied that too often the author's powers as a skilled advocate have been enlisted in favor of "Vater Fritz" and his doings. Frederick the Great was soon translated into German, and has naturally been popular in Germany.

In 1866, having been elected lord rector of Edinburgh University, he delivered an installation address to the students 'On the Choice of Books.' While still in Scotland the sad news reached him that his wife had died suddenly in London. This was a severe blow to Carlyle. Mrs. Carlyle, besides being a woman of exceptional intellect, was a most devoted and affectionate wife. On her tombstone beside the abbey church of Haddington he has recorded her virtues and his sorrow for her loss, stating that at her death his light was as if gone out. From this time his productions were mostly articles or letters on topics of the day, including 'Shooting Niagara; and After?' in which he gave vent to his serious misgivings as to the results of the Reform Bill of 1867. An unimportant historical sketch, 'The Early Kings of Norway,' appeared in 1874, but was written long before. Carlyle died at Chelsea, and was buried at Ecclefechan. He left the estate of Craigenputtock to the University of Edinburgh, settling that the income from it should form ten bursaries to be annually competed for — five for proficiency in mathematics and five for classics (including English). In 1881 Carlyle's 'Reminiscences' connected with the earlier part of his life were published by J. A. Froude, who also published a biography of Carlyle (1882–4, 4 vols.), and edited the 'Letters and Memorials of Mrs. Carlyle' (1883). In the last-named year was published the 'Correspondence of Carlyle and Emerson' between 1834 and 1872.

Carlyle's command over the English language was greater than that of almost any other prose writer, and his style was unique. It has been called unnatural, a distortion of the English language, a mere literary device or affectation to attract notice; but this is but a superficial criticism. That it is often eccentric, often uncouth, often rugged, often extravagant, may be admitted; but one who studies it cannot but recognize that it was so only as being the natural vehicle of expressing his thoughts. It grew and developed as the writer grew and developed, and in his hands was an instrument of unsurpassable power. Lowell has said of him, "Though not the safest of guides in politics or practical philosophy, his value as an inspirer and awakener cannot be overestimated. It is a power which belongs only to the highest order of minds, for it is none but a divine fire that can so kindle and irradiate. The debt due him from those who listened to the teachings of his prime for revealing to them what sublime reserves of power even the humblest may find in manliness, sincerity, and self-reliance, can be paid with nothing short of reverential gratitude." See Wylie, 'Thomas Carlyle: the Man and His Books' (1881); Masson, 'Carlyle Personally and in His Writings' (1885); Lives by Garnett (1887); Nichol (1894).

Carmack, Edward Ward, American politician: b. near Castilian Springs, Summer County, Tenn., 5 Nov. 1858. He studied law and after admission to the bar practised his profession at Columbia, Tenn. He was member of the State legislature in 1884; was on the editorial staff of the 'Nashville American,' (1886–8), and in 1892 became editor of the 'Memphis Commercial.' He served two terms in Congress as Democratic representative from the 10th Tennessee district 1897–1901, and in the year last named was appointed to the United States Senate.

Carmagnola, Francesco, frän-chĕs'kō kär-män-yō'la, Italian *condottiere*: b. Carmagnola, about 1390; d. Venice, 3 May 1432. His real name was Bussone, but he adopted as his own the name of his birthplace. The son of a peasant, he was a herdsman in his youth; but enlisting in the service of the Duke of Milan (Filippo Maria

Visconti), he rapidly rose in rank, and aided his master in regaining a great part of Lombardy, and in extending his possessions. The Duke, however, became suspicious of his loyalty, confiscated his property, cast his wife and children into prison, and banished him; upon which Carmagnola entered the service of the republic of Venice, from which he received the appointment of generalissimo. He wrested Brescia from the Duke of Milan, and entirely routed his army at the battle of Macalo in 1427. After the battle he released his prisoners, which was frequently done at that time by *condottieri*, but incurring the suspicions of the Venetian senate for doing so, and his subsequent military operations not proving successful, he was recalled to Venice, under the pretext that his advice was needed for affairs of state, placed under arrest, accused of treason, put to the torture and beheaded.

Carmagnole, kär-män-yōl, a name applied in the early times of the French republic (1792–3) to a song which was accompanied by a dance. The song contained 13 couplets and the following refrain:

"Dansons la carmagnole
Vive le son, vive le son
Dansons la carmagnole,
Vive le son du canon."

The appellation originated, probably, from the name given to a peculiar form of vest worn by the confederates of Marseilles, who came to Paris in August 1792, to co-operate with the revolutionaries of the capital. The author and composer of the song are unknown. It is notable simply for its historical associations; not for the intrinsic merits of words or music. The song and dance were first used at the time of the indignation of the people on account of the veto allowed to the king on the resolves of the National Assembly. The Carmagnole was commonly sung and danced at popular festivals, executions, and eruptions of popular discontent. Afterward the name was also applied to the national guards, who wore a dress of a peculiar cut, and to the enthusiastic supporters of the Revolution. Several members of the National Convention — Barère, for instance — by way of jest, gave this name to their communications to the assembly.

Car'man, Elbert S., American editor: b. Hempstead, N. Y., 1836; d. New York, 28 Feb. 1900. He was graduated at Brown University in 1858, began contributing to the 'Turf, Field, and Farm' and similar publications early in life, and became owner and editor of the 'Rural New Yorker' in 1876. In connection with the last publication he established a farm at River Edge, N. J., where he gave much of his time to testing new plants, vines, and seeds, and also to originating new varieties of vegetables, fruits, and grains.

Carman, Ezra Ayers, American military officer: b. Metuchen, N. J., 27 Feb. 1834. He was graduated at the Western Military Institute, Kentucky, in 1855, and was assistant professor of mathematics in the University of Nashville in 1855–6. He served through the Civil War in the Army of the Potomac and the Army of the Cumberland; and attained the rank of brigadier-general of volunteers. He was comptroller of Jersey City in 1871–5; clerk in the United States Department of Agriculture in 1877–85; and a member of the Antietam Battlefield Board.

Carman, William Bliss, Canadian poet and journalist: b. Fredericton, N. B., 15 April 1861. He was educated at the universities of New Brunswick, Edinburgh, and Harvard, and has since done much journalistic work for New York and Boston papers. His verse has been widely read and his successive volumes include: 'Low Tide on Grand Pré' (1893); 'A Sea Mark' (1895); 'Behind the Arras' (1895); 'Ballads of Lost Haven' (1897); 'By the Aurelian Wall' (1897); 'Songs from Vagabondia,' joint author with R. Hovey (1894); 'More Songs from Vagabondia' (with Hovey) (1896); 'Last Songs from Vagabondia' (with Hovey) (1900); 'A Winter Holiday.' In 1903 he became editor of 'The Literary World.'

Carmarthen, kär-mär'thĕn, or **Caermarthen** (Welsh, *Caer Fyrddyn*), South Wales, a seaport town, capital of Carmarthenshire, 9 miles from Carmarthen Bay, Bristol Channel, and 14 miles northwest of Llanelly, on the right bank of the Towy. The principal buildings are the county hall, St. Peter's church, and St. David's church. Besides the established churches there are numerous places of worship belonging to other denominations. Of public and private schools the most prominent are the South Wales Training College, Sir Thomas Powell's Free Grammar School, Queen Elizabeth's Grammar School, etc. There are also two infirmaries and a literary and scientific institution. There are some tin and lead works, cloth manufactories, and iron foundries, and the salmon fishery is extensive. Pop. (1901) 9,935.

Carmarthenshire, or **Caermarthenshire,** South Wales, a maritime county, and the largest of all the Welsh counties; extreme length, 53 miles; breadth, 35 miles; area, 594,405 acres. It is mountainous generally, but not so rugged as some other Welsh counties. Some of the vales are beautiful, particularly that of Towy, which is 30 miles in length. The principal river, the Tywi or Towy, rises in Cardiganshire. This river and the Tave are the only navigable streams in the county. The valleys are fertile, and numerous herds of small black cattle are raised on the hills. The mineral products of the county are iron, lead, coal, and limestone. There are few manufactures. Pop. (1901) 135,375.

Carmaux, kär-mō, France, a city in the department of Tarn, nine miles northeast of Albi by rail. It is one of the great coal-mining centres of France, the annual output of coal sometimes reaching as much as 600,000 tons. Serious strikes and riots took place here in 1892.

Car'mel, a mountain ridge in Palestine, constituting part of Lebanon, on the southern frontier of Galilee, in the pashalic of Acca. It consists of several rich, woody heights, separated by fertile and habitable valleys within a circuit of about 28 miles, and terminates at the mouth of the Kishon in a lovely plain, which forms the southern coast of the Gulf of Ptolemais or Acca, on the Mediterranean. Upon different parts of this mountain there are ruins of churches and monasteries from the time of the Christian kingdom of Jerusalem, and the cave which, according to tradition, was inhabited by the prophet Elijah.

Car'melites, one of the four mendicant orders of the Roman Catholic Church; its full

title is Friars of Our Lady of Mount Carmel. The order has, traditionally, a very ancient origin, but as a religious order approved by the Roman Catholic Church is contemporary with the Dominican and Franciscan orders. According to the legends the Carmelites trace the origin of their order back to the early days of the kingdom of Israel, the time of the prophets Elijah (Elias) and Elisha (Elisæus). Elias, in his early manhood, says the legend, retired for religious contemplation to Mount Carmel, and there, taught by an angel, gathered to himself a number of men of like disposition, and instituted a society of contemplatives for worship of the true God and the attainment of spiritual perfection. Among the disciples attracted to this school of religion were the youths who afterward were the minor prophets Jonah, Micah, and Obadiah; and at a later period the renowned philosopher of Magna Græcia, Pythagoras, was numbered among the inquirers after the true religion and the science of divine things in this great school of the prophets: Pythagoras' instructor was the prophet Daniel. Elijah's wife instituted an order of female recluses. As pointing to the existence on Mount Carmel of some such institution as the legend postulates, reference is made to 1 Kings xviii. 19 and following; 2 Kings ii. 25; and 2 Kings iv. 25.

The world outside the precincts of those religious communities appears to have been entirely ignorant of this ancient institution till early in the 13th century, when Phocas, a Greek monk of Patmos, brought to the Latin patriarch of Constantinople intelligence of the existence in olden time of a great monastic or eremitic establishment on Mount Carmel, of which traces still remained. The site of the ancient ruins was occupied by a venerable monk from Calabria and 10 companion monks; and for these Phocas petitioned the patriarch to formulate or to approve a rule of monastic or eremitical life. This was done, and afterward the rule was approved by Pope Honorius III. in 1224. The connection of this order with the ancient school of the prophets, even if the traditional story be accepted, seems to lack proof. All that we are told which could give color to the claim that the new eremites are in the line of succession from the eminent school of prophets is, that in a vision Elias gave orders to the monk from Calabria to found a religious establishment on the ancient site. The community was expelled by the Saracens from its seat on Mount Carmel and took refuge in the west. One of the earliest houses of the Carmelite order in the west was founded at Alnwick in England; and about the same time, near the middle of the 13th century, St. Louis, the king, founded at Paris the first Carmelite house in France — the *Carmes*, of terrible celebrity in the great Revolution. Pope Innocent IV. modified the rule of the order and assimilated it to the Dominican and Franciscan rule. One of the traditions represents Jesus and his mother as initiates of the ancient order; and Saint Simon Stock, sixth general of the order, an Englishman, received from the hands of the Virgin the scapulary of Mount Carmel with the assurance that whoso should die wearing that scapulary would surely not be damned. A relaxation of the primitive severity of the rule was permitted by Eugenius IV. in 1431, and this led to a scission of the order into two suborders, the Conventuals or Calced (wearing shoes) and the Observants or Discalced (shoeless or barefooted). Pope Benedict XIII. in 1725 permitted the order to add to the statues in Saint Peter's Church of founders of religious orders, one to their founder, which was erected with the inscription: "Universus Ordo Carmelitarum Fundatori suo Sancto Eliæ prophetæ erexit" ("The whole order of the Carmelites erected this statue to their founder, Saint Elias, the prophet"). The order of Carmelite nuns dates from the middle of the 15th century. In 1562 the great mystic Saint Teresa, who was a Carmelite nun, in virtue of a papal brief established a separate branch of the sisterhood, under a very severe rule: these are the Barefoot Carmelite Nuns. She then undertook to restore in the original order of Carmelite Friars the ancient severity of discipline, and succeeded; the result is the order or suborder of the Barefoot or Discalced Carmelites. The Carmelite order, in its several forms, has establishments all over the world. The headquarters of the order in America are at Niagara Falls.

Car'men, a novel by Prosper Mérimée, published in 1847. Don José Lizzarrabengoa, Navarrese and corporal in a cavalry regiment, meets at Seville a gypsy known as Carmen. While taking her to prison for a murderous assault on another woman, he connives at her escape, and is reduced to the ranks. Jealous, he kills his lieutenant, and joins a band of smugglers. In a duel he kills Garcia, her *rom* or husband, and becomes her *rom* in turn. He offers to forget everything if she will go with him to America. She refuses, for the sake of another lover, as he believes, and he threatens to kill her. She answers that it is so ordained, but that "free Carmen has been, and free she will always be." Don José kills her, buries her body in the woods, rides to Cordova, and delivers himself to the authorities. The romance is best known in its operatic version, the adaptation having been made by Meilhac and Halévy.

Carmen Sylva, pen name of ELIZABETH, queen of Rumania (q.v.).

Carmi, Ill., a city and county-seat of White County, 150 miles southeast of Springfield, on the Little Wabash River. It is the centre of an agricultural region and exports fruit, grain, flour, tile, and lumber. It has flouring and saw mills, brick works, machine shops, etc. Pop. (1900) 2,939.

Carmichael, kär'mī-kal, **Frederic Falkiner,** Irish clergyman and author: b. 1831. He was educated privately, and entering the Anglican ministry in 1857 held several church preferments in Dublin, becoming a canon of Christ Church Cathedral, Dublin, 1886. He has published: 'Jesus Christ, the Way, the Truth, the Life'; 'Donellan Lectures' (1876); 'The Responsibilities of God'; 'All Men Shall at Length be Saved'; 'The Ghost of Samuel.'

Carmichael, Montgomery, English civil servant: b. Birkenhead, England, 17 May 1857. He was educated at Bonn and Munich and entered the English consular service in 1890. In 1892 he was appointed vice-consul at Leghorn, and he has been vice-consul for West Tuscany from 1896. He is a regular contributor to the 'Saturday Review,' and has published 'Sketches and Stories, Grave and Gay' (1896); 'In Tus-

cany,' a delightfully sympathetic description of Tuscan life (1901); 'The Lady Poverty' (1901); 'Life of John William Walshe,' a strongly conceived piece of imaginary biography (1902).

Car'minatives, remedies that cause a warm, pleasant sensation in the stomach and act as stimulants to the muscles, causing peristalsis, thus relieving flatus; and that increase the flow of the gastric and intestinal secretions. Most of the drugs containing volatile oils are carminatives; as, the mint family, parsley, anise, fennel, caraway, cardamom, ginger, cinnamon, cloves, etc. See VOLATILE OILS.

Car'mine, the most splendid of all the red colors, is made from the cochineal insect, or *Coccus cacti.* The finest is that which is thrown down from an aqueous infusion by chloride of tin. This, after depositing, is collected and dried. The operations require the greatest care, for the brilliancy of the color is affected by the weather, light, and temperature. The color produced by alum has a darker tint, and constitutes lake. Carmine, or carminic acid, is also the name given by chemists to the coloring matter of cochineal. The acid is a purplish body, extremely soluble in water and in alcohol. It forms salts with the heavy metals, and it yields various products when acted on by chlorine, nitric acid, and other re-agents. Carmine is used to some extent in dyeing, in water-color painting, to color artificial flowers, confectionery, etc.

Carmo'na (ancient CARMO), a town in Spain, 20 miles from Seville, on a height overlooking a large plain covered with olive-trees. It is well built, containing many handsome mansions belonging to the nobility, who, though usually resident in Seville, spend part of the year here. The principal square is well planted, and, among other edifices, possesses a handsome Gothic church with a lofty spire. Another conspicuous object is a Moorish castle, flanked with massive towers, and there are two old Roman gates. The manufactures are chiefly woolen hats, leather, and earthenware. Recent important excavations on the site of the ancient necropolis, to the west of the modern town, have brought to light a large number of tombs and funeral triclinia in almost perfect preservation. Considerable portions of the Moorish wall and Alcazar still remain. Pop. (1903) 18,000.

Carmontel, kär-môn-tĕl, or **Carmontelle, Louis Carrogis,** loo-ē kär-rō-zhē, French poet: b. Paris, 15 Aug. 1717; d. there, 26 Dec. 1806. He is best known by his 'Proverbes Dramatiques' (10 vols.). These are without much connection in themselves, being, in fact, only a series of dramatic scenes, but are well adapted for private theatres. The fertility of Carmontel was as extraordinary as his ease in writing. He is said to have left, besides his printed works and his pieces for the theatre, more than a hundred volumes of manuscripts.

Carnac, kär-nak, France, a village in the department of Morbihan, on a height near the coast, 15 miles southeast of Lorient, and remarkable for the so-called Druidical monuments in its vicinity. These consist of more than 1,100 rude blocks of gray granite, some of which are upward of 18 feet high, standing on end in the midst of a wide heath. They are in the form of unpolished obelisks, with the vertex reversed, and are arranged in 11 lines, forming 10 avenues, with a curved row at one end. There are many gaps in the lines; almost every house and wall in the vicinity is seemingly built from this artificial quarry. They are evidently of very ancient date, but their origin is unknown. Pop. (1891) 2,901. See Lukis, 'Chambered Barrows and Other Historic Monuments in Morbihan' (1875); Miln, 'Excavations at Carnac' (1877–81).

Carnahuba. See CARNAUBA.

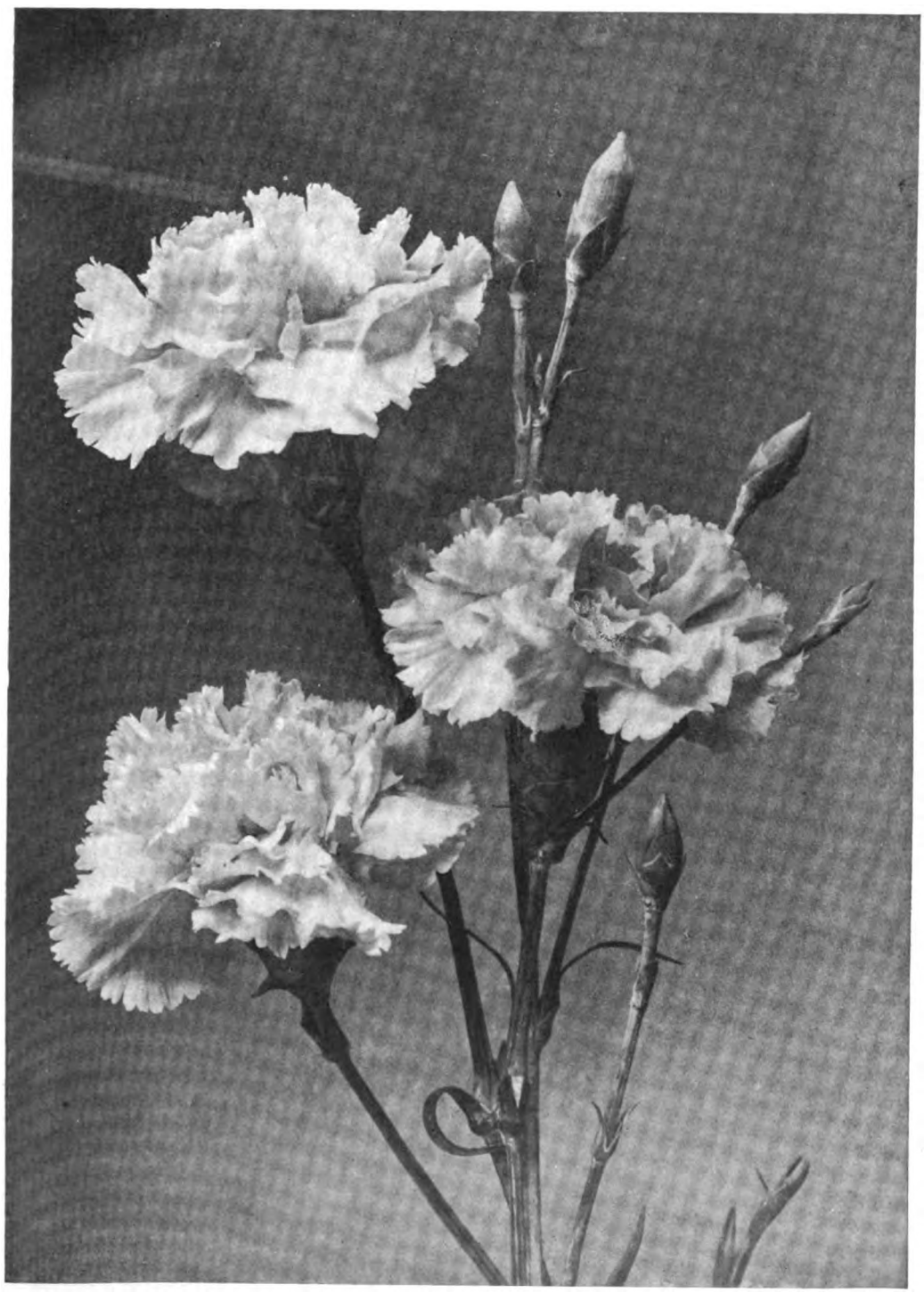
Car'nall, Rudolph von, German mining engineer: b. Glatz, 1804; d. 1874. He began the study of mining in Berlin in 1823, was connected with the mining industry in Upper Silesia and rose to be superintendent of mines and director of the general mining office in Breslau. He took part in founding the German Geological Society, lectured at the University of Berlin on the science of mining engineering, and rendered important service to the development of German mining.

Car'nallite, a hydrous chloride of potassium and magnesium, found at Stassfurt, Prussia, and of great commercial importance as being one of the minerals from which come the world's supply of potash salts. See POTASSIUM.

Carnarvon, kär när'vŏn, **Henry Howard Molyneux** (4th EARL OF), English statesman: b. London, 24 June 1831; d. 28 June 1890. He succeeded his father in the earldom in 1849, and was secretary of state for the colonies, June 1866 to March 1867. During his secretaryship he devised a scheme for the federation of the British North American Colonies, subsequently approved by Parliament. He was again colonial secretary, 1874–8, and lord-lieutenant of Ireland, 1885–6. He published 'The Druses of Mount Lebanon' (1860).

Carnarvon, or **Caernarvon,** Wales, a seaport town and parliamentary borough, on the southeast side of the Menai Strait, and capital of the county, 209 miles northwest of London. The ancient walls thrown around it by Edward I., and flanked by round towers, are still fairly entire. The magnificent castle or palace of Edward I., and in which Edward II. was born, stands at the west end of the town, almost overhanging the sea, and is externally entire. Including its court-yards, etc., it covers about two acres of ground. There are extensive ironworks in the town, which supply machinery for steamers, etc. Pop. (1901) 9,760.

Carnar'vonshire, or **Caernarvonshire,** Wales, a maritime county having Carnarvon Bay on the west; Denbigh on the east; the island of Anglesea and the Irish Sea on the north; and Cardigan Bay on the south. Its extreme length, southwest to northeast, is about 52 miles; extreme breadth, 20 miles, although the greater portion of it does not exceed seven or eight miles on an average; area, 369,477 acres. This county is traversed throughout its whole length by lofty mountains, including the Snowdon range, whose highest peak is 3,557 feet above the sea. There are other summits varying from 1,500 feet to more than 3,000 feet. Dairy farming, and cattle, horse, and sheep breeding are the principal occupations of the farmer. The cattle and sheep are of a small breed. Lead and copper ores are found in the mountains south, and there are slate quarries at Bethesda,



Photograph by J. Horace McFarland Co.

CARNATION

Mau

Llanberis, and Nantlle, which have been extensively and profitably worked. Pop. (1901) 126,835.

Carnatic, kär-năt'ĭc, former province of British India, on the east coast of the peninsula. Its limits were ill defined, but it is commonly thought to have extended from Cape Comorin to lat. 16° N., and from the coast line to an average of about 80 miles inland. It was formerly included in the dominions of the nabob of Arcot, and the contentions arising from a disputed succession first brought the French and English into collision, and ended by the subjugation of the Carnatic under the British influence, which was completely effected in 1801. The Carnatic as one of the wealthy provinces has been the cause of endless native warfare and bloodshed, by which, whoever was victor, the unhappy cultivator suffered in the end; as each successive ruler, feeling his tenure uncertain, cared only to make revenue while the power lasted, an example which was but too closely imitated by his unscrupulous ministers and officials. The Carnatic is now included within the administration of the presidency of Madras.

Carnation, a half-hardy perennial herb (*Dianthus caryophyllus*) of the natural order *Caryophyllaceæ,* a native of southern Europe. It has more or less erect stems with enlarged joints, linear opposite leaves covered with a bloom, and solitary, variously colored terminal perfumed flowers, which naturally appear during summer, but which are produced artificially by certain varieties throughout the year. The plant has been in cultivation for its flowers for more than 2,000 years, but not until the early years of the 16th century did its flowers become greatly differentiated from their original flesh tint, which suggested the popular name (Latin *carnatio*). So numerous became the varieties that systems of classification were adopted. The popular European system of to-day is: (1) "Selfs," flowers of one color; (2) flakes, flowers with yellow or white ground and striped with either rose, scarlet, or purple; (3) "bizarres," resembling flakes except that they are striped with more than one color; (4) "picotees," with white or yellow petals margined with red, etc. The summer-blooming carnations which suggested this classification are little grown in America, but are very popular in Europe. They seem to demand a moist, cool climate. The group most cultivated in America and known as perpetual-flowering tree, or monthly carnations, originated in France about 1840 as the result of crossing and selection. The first of these varieties imported into America is said to have arrived in 1868, since when the growing of carnations under glass as a crop has developed. The extent of the industry is very great and is steadily growing. According to the census report of 1900 the value of the carnation crop in 1899 was about $4,000,000, produced in about 9,000 American commercial greenhouses.

Propagation of the monthly carnations is usually effected by means of cuttings of young stems. When well rooted they are potted in good soil and kept until late spring, when they are transplated to the open ground or to the benches where they are to blossom. A winter temperature ranging between 50 and 55° at night and preferably only 10° higher during the day, is desirable. At the end of the winter they are thrown away.

The most common insect pests of the carnation are the red spider and the green aphis. The red spider thrives best in dry atmosphere, and is most easily controlled by syringing with water and evaporating (not burning) sulphur in the greenhouse once a week for about five weeks, when the insects become troublesome. The green fly or green aphis seems to thrive under any ordinary conditions. It is usually fought with tobacco fumes or various extracts of tobacco. Three fungous diseases are often troublesome: Rust (*Uromyces caryophyllinus*), spot, or blight (*Septoria dianthi*), and anthracnose (*Volutella sp*). These are largely prevented by judicious management, and when they occur may be controlled by destroying diseased plants and by spraying with Bordeaux mixture (see FUNGICIDE). Rust appears on the stems and leaves as blisters which break and expose brown spores. Spot consists of brown dots with black centres where the spores are borne. Anthracnose is characterized by grayish-brown spots. (Bailey, 'Cyclopædia of American Horticulture,' New York 1900–1902). Thirty-seven acres of land are devoted to the raising of carnations at a nursery in Los Angeles, California. Nine greenhouses, each 200 feet long and 15 feet wide, together holding 35 tons of glass, are used to raise the young plants.

Carna'tion (Latin, *caro, carnis,* "flesh"), in the fine arts, the coloring of the skin of the human body. The use of carnation requires very attentive study and great skill in the artist. It varies with the sex of the individual, with the classes and countries to which the subjects belong, with the passions, the state of the health, etc. The cheeks are, in a healthy subject, of a lively red; the breast, neck, and upper part of the arms of a soft white; the belly yellowish. At the extremities the color becomes colder, and at the joints assumes a violet tint, on account of the transparency of the skin. All these shades require to be softly blended. Two faults in carnation are chiefly to be avoided,— hardness, the fault of the masters of the 15th century, and too great weakness. Guido Reni not infrequently painted his flesh so that it appeared almost bloodless. The French school has gone farthest in this respect. The flesh of the followers of this school often looks like porcelain or wax. Titian and Rubens are unrivaled in carnation.

Carnauba, kär-nä-oo'bạ, the Brazilian name of the palm, *Copernica cerifera,* which has its leaves coated with waxy scales (whence the name wax-palm), yielding a useful wax by boiling. The fruit and pith are eaten, the leaves are variously employed, and the wood is used in building.

Carne'ades, Greek philosopher: b. Cyrene, Africa, 213 B.C.; d. 123 B.C. He studied first under Diogenes the Stoic, but subsequently attended the lectures of Egesinus, who explained the doctrines of Arcesilaus; and succeeding his master in the chair of the academy, he restored its reputation by softening the prevailing pyrrhonism and admitting practical probabilities. The doctrine of Carneades specifically was, that "as the senses, the understanding, and the imagination frequently deceive us, they cannot be the infallible judges of truth, but that from the im-

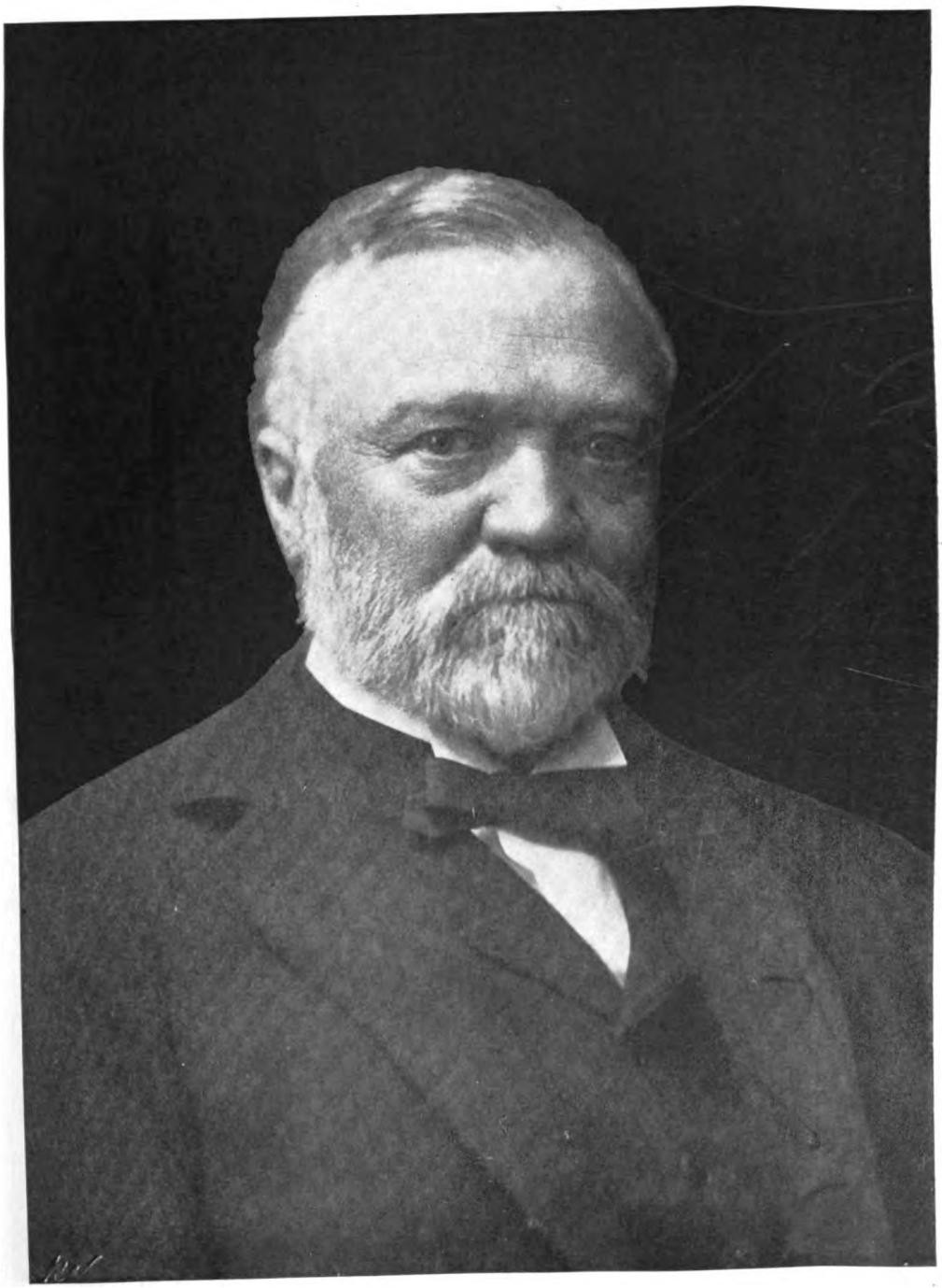
pression made by the senses we infer appearances of truth, which, with respect to the conduct of life, are a sufficient guide.» He was a strenuous opposer of Chrysippus, and attacked with great vigor the system of theology of the Stoics. He was an advocate of free-will against the fate of the same sect, and urged just the same difficulties in reconciling divine prescience with the freedom of human actions as have divided some contending sects of Christianity. One of the most distinguished events of his life was his being joined in an embassy to Rome wth Diogenes the Stoic and Critolaus the Peripatetic, in order to gain the mitigation of a fine levied by the Roman senate on the Athenians. This extraordinary embassy was successful, and Carneades so captivated the people by his eloquence, one day delivering a harangue in praise of justice, and on the next proving it to be an odious institution, that Cato the censor, fearful of its effect on the Roman youth, persuaded the senate to send the philosophers back to their schools without delay. In his latter years Carneades became totally blind; he died in his 90th year, continually complaining of the shortness of life, and lamenting that the same nature which composed the human frame could dissolve it.

Carnegie, Andrew, American iron-master, manufacturer and philanthropist: b. Dunfermline, Scotland, 25 Nov. 1837. None even of the mighty makers of their own fortunes began closer to absolute zero; certainly none who have owed success not to fortunate speculations, but to steady labor, sagacity, and self-culture, the natural working of the highest powers on opportunities open to all and less to him than to most. His father owned a small hand-loom business, which was closed in 1848 by the competition of steam. He then emigrated to the United States and settled in Allegheny City, Pa. The 10-year-old child here became a bobbin-boy at 20 cents a day; his alertness in a few months brought him transference to an engine-room, his penmanship and arithmetic a chance to do clerical work. Next a telegraph messenger boy at Pittsburg (with a mother and younger brother to support from his slender wages), he promptly mastered telegraphy, was soon given a place as operator, and won himself extra earnings and experience in composition as a newspaper telegraph reporter. Superior fitness brought him the post of telegraphic train-despatcher to the Pennsylvania R.R.; then of secretary to its general superintendent, Col. Scott; and in 1860, when his chief became vice-president, Mr. Carnegie was made superintendent of the Western Division. Meantime his business fortune had opened with the tentative adoption by the road, through his agency, of the Woodruff sleeping-car system, in which he shrewdly embarked some borrowed money; his expert knowledge made it investment, not speculation; and his dividends went partially into oil lands around Oil City, selected with equal judgment. At the outbreak of the war, Col. Scott was made assistant secretary of war, and gave Mr. Carnegie charge of the eastern military railroads and telegraph lines, and of this department there was no complaint or scandal, and no breakdown except of Mr. Carnegie's health from overwork. He was also the third man wounded on the Union side, while removing obstructions from the Washington tracks.

Already a small capitalist, in 1862 the Pennsylvania road's experiments in replacing wooden with iron bridges led him to forecast the future monopoly of the latter, and organize the Keystone Bridge Works, which built the first iron bridge across the Ohio. To increase their profit by furnishing their own iron, he entered the field which has made him one of the industrial sovereigns of all time. The first step was the erection of the Union Iron Mills, furnaces and rolling mills; the last, after inspection of the Bessemer process in England, to establish it in this country in 1868. The story since is one of swift aggregation of plant on plant, till they have dominated their class, and become one of the chief industrial factors of the entire business world in this its greatest age. By 1888 he had acquired a controlling interest in his foremost rival, the Homestead Steel Works, and in seven other immense establishments centred around Pittsburg; in 1899 he consolidated all these into one giant structure, the Carnegie Steel Company; and in 1901 he retired from business life, transferring his company at a valuation of $500,000,000 to be merged into one still vaster, the United States Steel Corporation, formed by J. Pierpont Morgan. His United States residence is in New York; his summer establishment at Skibo Castle, in the extreme north of Scotland.

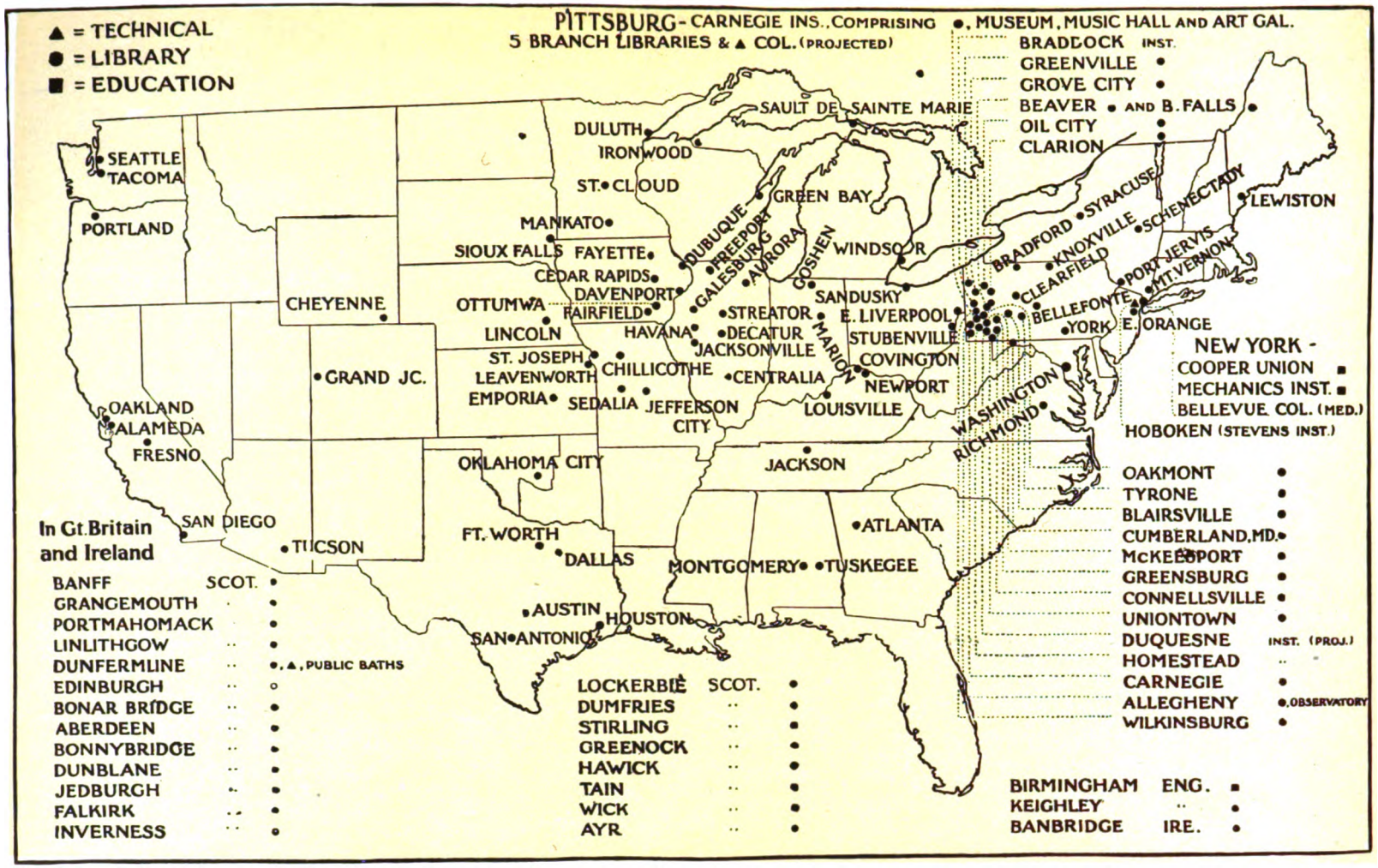
Such supreme success, fairly won in a struggle with the world, is of course the result of a supreme individual genius not to be taught or explained; but as the amount of work any one man can do unassisted is a trifle, the chief instrumentality is always the faculty of organization. Mr. Carnegie himself once said that the organization *was* the business; that if striped at a blow of all his material property and business connections, but left his organization, in four years he would have re-established himself. But the organization is simply the men who work it, with their capacity of selecting capable subordinates, and understanding public needs and the means of supplying them; and this leaves the faculty of creating and sustaining it no nearer solution than before. In the last analysis it means a nicely accurate judgment of *men,* resulting from an intuitive gift informed and tested by long experience; and as men are not pawns, it implies the power of persuading them into and keeping them in alliance as well.

Always a generous and helpful man, he had definitely begun, a few years before his retirement, a new existence consecrated to public service, and to which he will owe enduring remembrance. Another generation would have forgotten the mere business man, however great; for after all it would have had steel from some source, if perhaps less cheaply; but it could not have had from lesser men, and would not have had from any, the splendid, judicious, and permanently useful gifts with which he has endowed it, and which no change of social ideals can render obsolete or harmful. No one has ever so royally returned to the public what he had (to its own benefit) drawn from the public. This is his own expressed conviction of duty; that «surplus wealth is a sacred trust to be administered for the highest good of the people,» and that sometime «the man who dies possessed of millions free and ready to be distributed, will die disgraced.» But he is equally

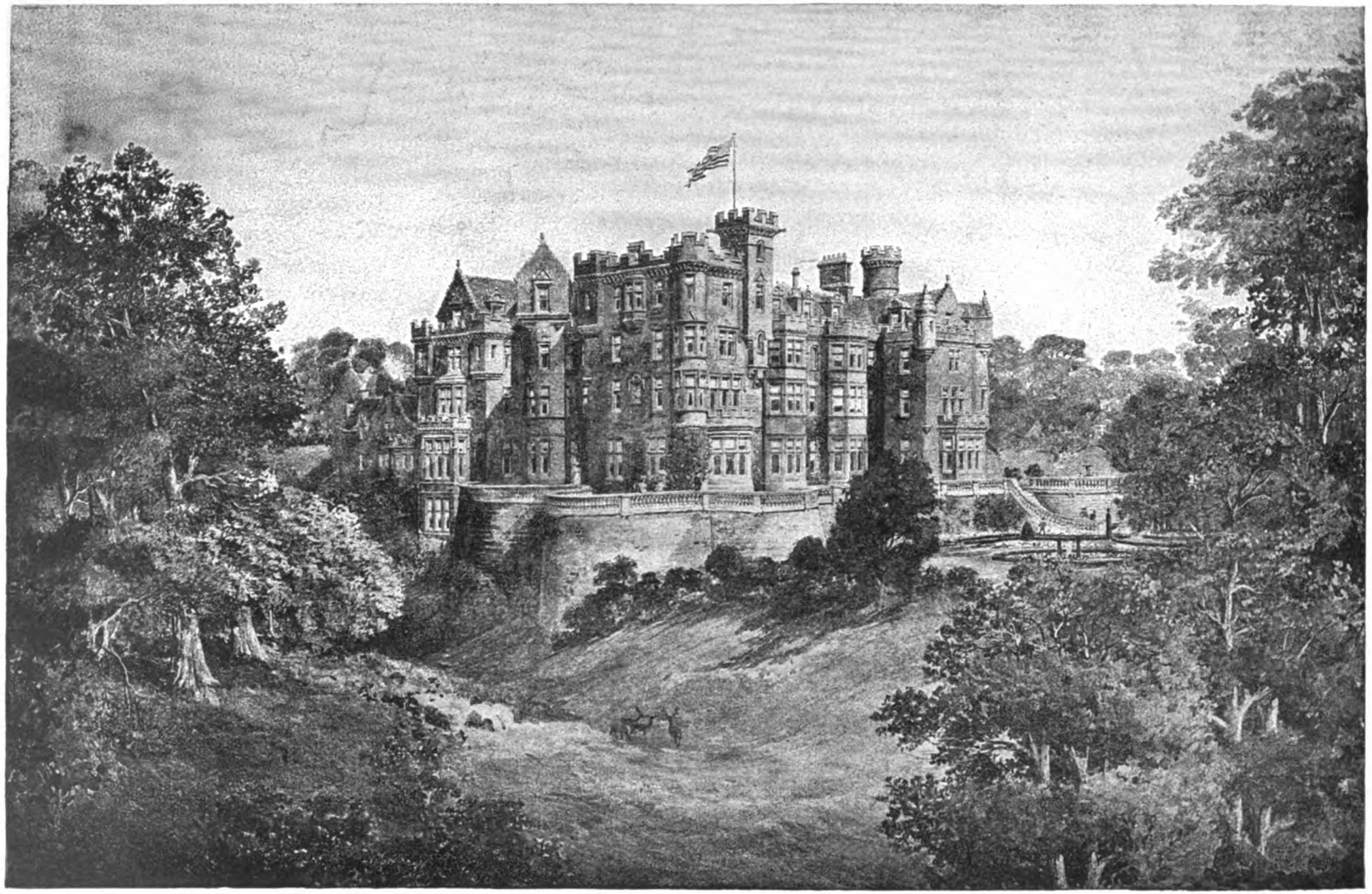


ANDREW CARNEGIE

Map



MAP SHOWING THE LIBRARIES ALREADY PRESENTED BY MR. CARNEGIE, 1902.



SKIBO CASTLE, MR. CARNEGIE'S HOME IN SCOTLAND.

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emphatic in declaring that indiscriminate giving is mostly sheer mischief, and that no person and no community can be permanently helped except by their own co-operation. Therefore, every gift of his to a community is conditioned on the latter supporting it; and all those to institutions are thought out, and so bestowed that they forward the work without impairing the springs of public interest, or the ties to the public, which must after all be their permanent stay. These gifts are mostly not to charities in the current sense, relief of material distresses, for which the spirit of human brotherhood should be adequate; but for that mental and spiritual cultivation which should raise communities out of the lowest plane of social evils. An apparent exception, which, however, is not charity but justice and business sense, is the endowment of $4,000,000 given for an annuity fund to the workers at Homestead. The remainder of his benefactions may be divided broadly into institutions for research and the discovery of fertile new ideas; those for teaching the best of ideas and their practical appliances already known; and those for storing the results of knowledge and creation and distributing them to the public — in a word, universities, colleges, and technical schools, and libraries. Even the organs he has presented to several hundred churches may be classed in this category; as he genially observed, he is willing to indorse unreservedly all the utterances of the organs, but not of the preachers. The total amount of his benefactions to date is upward of $70,000,000, of which some $55,000,000 has been given in the United States, and with much more ultimately assured. The greatest single foundation will be the Carnegie Institute at Pittsburg, an enormous technological school, with library, art gallery, and every imaginable accessory,— the people's college of what he thinks the coming type,— which has received $10,000,000 already and is promised $25,000,000 in all. Next is the Carnegie Institution (q.v.) at Washington, to promote original research and enable original workers to use their whole time for study, experiment, and creation; perhaps his most valuable benefaction ultimately, since new ideas are at once the scarcest and the most valuable items of the world's income, and the work of one great man outweighs that of 10 generations of small ones. Of the others, perhaps the most useful, considering the work, and the chief, is the gift of $600,000 to the Tuskegee Normal and Industrial Institute in Alabama, conditioned on the trustees using enough of its income annually to free Booker T. Washington, its head, from money cares and the need of "drumming" support for his college the rest of his life, and enable him to devote his whole time to this noble institution. Sixty-five libraries in New York have received $5,200,000; one in St. Louis $1,000,000, and two in Detroit and San Francisco $750,000 each; libraries at Homestead, Braddock, and Duquesne $1,000,000; and the universities in his native Scotland $10,000,000.

Mr. Carnegie has also won fame as an author, in addition to his other distinctions; and the public appreciation has been evinced in the emphatic and unfeigned form of a large unaided sale. His first works, 'Notes of a Trip Around the World' (1879) and 'Our Coaching Trip' (1882), were printed first for private circulation, but published in consequence of the great pressure for private copies. 'An American Four-in-Hand in Britain' (1883) and 'Round the World' (1884) followed; but his greatest success was attained with 'Triumphant Democracy' (1886), which sold 40,000 copies within two years. 'The Gospel of Wealth' (1900) and 'The Empire of Business' (1902) have maintained his reputation as a clear, forcible, and interesting writer.

Carnegie Institution, an educational body incorporated 4 Jan. 1902, in Washington, D. C., by John Hay, secretary of State; Edwin D. White, justice of the supreme court; Daniel C. Gilman, ex-president of Johns Hopkins University; Charles D. Walcott, superintendent of the United States Geological Survey; Dr. John S. Billings, director of the New York Public Library; and Carroll D. Wright, United States commissioner of labor. The aims of the university as expressed by the founder are: (1) To increase the efficiency of the universities and other institutions of learning throughout the country by utilizing and adding to their existing facilities, and by aiding teachers in the various institutions for the experimental and other work in these institutions as far as may be advisable; (2) to discover the exceptional man in every department of study, whenever and wherever found to enable him by financial aid to make the work for which he seems especially designed his life work; (3) to promote original research, paying great attention thereto as being one of the chief purposes of this institution; (4) to increase the facilities for higher education; (5) to enable such students as may find Washington the best point for their special studies to avail themselves of such advantages as may be open to them in the museums, libraries, laboratories, observatory, meteorological, piscicultural, and forestry schools and kindred institutions of the several departments of the government; (6) to insure the prompt publication and distribution of the results of scientific investigation, a field considered to be highly important.

The board of trustees elected by the corporators of the institution was as follows: The President of the United States (ex-officio), the president of the United States Senate, the speaker of the House of Representatives, the secretary of the Smithsonian Institution, the president of the National Academy of Sciences, and Grover Cleveland (New Jersey), John S. Billings (New York), William N. Frew (Pennsylvania), Lyman J. Gage (Illinois), Daniel C. Gilman (Maryland), John Hay (District of Columbia), Abram S. Hewitt (New Jersey), Henry L. Higginson (Massachusetts), Henry Hitchcock (Missouri), Charles L. Hutchinson (Illinois), William Lindsay (Kentucky), Seth Low (New York), Wayne McVeagh (Pennsylvania), D. O. Mills (California), S. Weir Mitchell (Pennsylvania), W. W. Morrow (California), Elihu Root (New York), John C. Spooner (Wisconsin), Andrew D. White (New York), Edward D. White (Louisiana), Charles D. Walcott (District of Columbia), and Carroll D. Wright (District of Columbia).

The trustees assembled in Washington on 29 Jan. 1902, received from Mr. Carnegie the deed of gift of $10,000,000, and elected Daniel C. Gilman, LL.D., president of the institution.

Carne'ia, a national festival of the ancient Spartans celebrated in honor of Apollo, and in

the Spartan month Carneios. The festival lasted nine days, during which the Spartans were not allowed to enter upon a hostile campaign.

Carnelian, a beautiful, translucent chalcedony (q.v.), usually of rich brownish-red color, though sometimes brown or more rarely yellow. Some of the finest Greek and Roman intaglios and seal rings are of carnelian or sard, which is a brownish-red or dark-brown carnelian. Sardonyx (q.v.) or sard with a white top, is cut into beautiful cameos. Fine carnelians come from Nova Scotia, Brazil, Uruguay, Arabia, and India. Cambay, in Hindustan, is a noted market for the Indian stones. The native jewelers, like the lapidaries of Idar (see AGATE), intensify the colors by baking the stones in the sun for several weeks and then in ovens.

Carneri, Bartholomäus von, bär-tō-lō mä'oos fōn kär-nā'rē, Austrian poet and politician: b. Trent 1821. His volume of poems 'Plough and Sword' was greatly admired. He has published 'Foundation of Ethic' (1881); 'Der Moderne Mensch' (1900); etc.

Car'nifax Ferry, W. Va., place at which occurred a battle of the Civil War, 10 Sept 1861. On 23 August Gen. John B. Floyd, who had marched from Lewisburg, crossed to the north side of Gauley River at Carnifax Ferry with five regiments of Virginia infantry, 100 cavalry, and five guns, aggregating about 2,600 men. The 7th Ohio had been guarding the ferry, but had been recalled to within six miles of Gauley Bridge, and then ordered to return to Cross Lanes, two miles from Floyd's position, which it reached in the night of the 25th. Early on the morning of the 26th Floyd advanced, surprised the regiment while at breakfast, and routed it, killing and wounding 45 and capturing 96. About 200 men escaped to Gauley Bridge and about 400 were collected and led by Major Casement to Charleston on the Kanawha. Floyd's intention in crossing the Gauley was to force the retreat of Gen. J. D. Cox from Gauley Bridge down the Kanawha Valley, whither he proposed to follow him and make a raid of 50 miles into Ohio, but Gen. H. A. Wise, who commanded one of his two brigades, had refused to obey his order to cross the Gauley, upon which Floyd abandoned his idea of invading Ohio, and intrenched his position in a bend of the Gauley, both flanks resting on the precipices rising abruptly from the river. The presence of Floyd north of the Gauley gave Gen. Rosecrans some uneasiness, and turned his attention from the Cheat Mountain region where he had been confronting Gen. R. E. Lee. Leaving Gen. J. J. Reynolds to oppose Lee, he drew troops from posts in the rear and assembled at Bulltown seven and a half regiments of Ohio infantry, two batteries of artillery and three companies of cavalry, which were formed into three brigades, commanded by Gen. H. W. Benham, and Colonels E. P. Scammon and R. L. McCook. On 9 September he marched from Bulltown, crossed Big Birch Mountain, drove the 36th Virginia and a company of cavalry from Summersville, on the morning of the 10th, and followed to Cross Lanes, which he reached at 2 P.M., and heard that Floyd was intrenched about two miles distant. Benham, commanding the leading brigade, was ordered to advance cautiously and feel Floyd closely, but not to engage him until the entire column came up, unless he saw a good opening. Benham drove in Floyd's pickets, and believing that he was in full retreat, pushed rashly forward in the face of a severe artillery fire, becoming closely engaged and making some spirited charges upon Floyd's works, which were repulsed. He then called for help. Rosecrans hastened up the brigades of Scammon and McCook, and going to the front, was surprised that the reconnoissance ordered had developed into a severe and badly conducted engagement. It was too late to withdraw without giving the appearance of defeat; other efforts were made, in which Scammon and McCook participated; but it was growing dark, the men were exhausted after their march of 17 miles, and Rosecrans withdrew, intending to renew the fight in the morning. During the night Floyd recrossed the Gauley, destroyed the foot-bridge behind him, sunk the ferry-boat and, with Wise, retreated to Sewell Mountain. The Union troops, fully exposed and not well handled, had 17 killed and 141 wounded. The Confederates, well protected by log-works, had none killed and 21 wounded. Consult Official Records, Vol. V.

E. A. CARMAN.

Carnio'la (German, KRAIN), a province of Austria, with an area of 3,856 English square miles. It is covered with lofty mountains, some of which are about 10,000 feet high, and, generally speaking, is one of the most unfertile regions of the empire. Some districts, however, produce considerable quantities of wheat, barley, wine, and, in the south, fruits of various kinds, and excellent flax. There are some iron, lead, and quicksilver mines, the latter exceedingly rich. It abounds in clays and valuable stones, and in coal and marble. There are considerable manufactures of iron, fine linen, lace, woolen cloth, flannel, worsted stockings, leather, wooden articles, etc. Its chief exports are steelwares, quicksilver, hats, linens, glasswares, wax, wine, flour, etc.; principal imports — salt, oil, fruit, coffee, sugar, tobacco, cloths, cattle, etc. Carniola was made a duchy in the 12th century, under the dominion of the Counts of Tyrol, who became extinct in 1335, and were succeeded by the Earls of Goerz. After the treaty of Vienna, in 1809, it was ceded to France, and incorporated in the kingdom of Illyria. In 1814 it came again into the possession of Austria. Capital, Laibach. Pop. (1900) 508,348.

Car'nival. The same views which led men to propitiate the higher invisible powers by gifts, sacrifices, and purifications, also introduced fasts, abstinence from pleasure, and penances. By fast is meant an abstinence from the usual means of nourishment, in order to mortify the appetites, and thereby to propitiate the Deity. In every nation of importance customs of this kind are found. Their historical origin is in the religious customs of the East, where the priests were originally the physicians of the people, and prescribed these fasts as a part of the regimen necessary in this warm region, as well as from religious views. Fasts are observed to this day in the East. The religions of the Persians and the Hindus, those of the Mohammedans, and of the worshippers of the Lama, insist much on fasts. Few traces of them are found in the religion of the ancient people of the North. The earliest Christians fasted on the vigils (q.v).

The fasts on the *jejunia quatuor tempestatum,* which continued for three days every quarter of the year, were penances, as was that of the period of 40 days (before Easter, or rather before Good Friday, *Quadrigesimæ*), which was called, by way of excellence, the fast, and which commemorated the 40 days' fast of Jesus in the wilderness. With regard to the origin of Christian fasts, opinions differ. The most common is, that Telesphorus, bishop of Rome, in the middle of the second century, first instituted the 40 days' fast as a rule of the Church. By Pope Gregory the Great, about 600, Ash Wednesday was made the beginning of the fast, and the day before was called fast eve, because in the night of this day, at twelve o'clock, the fast began. This fast was preceded by a feast of three days, very obnoxious to the strict zealots. "Christians," it is said, "on these days deliver themselves up to voluntary madness, put on masks, exchange sexes, clothe themselves like spectres, give themselves up to Bacchus and Venus, and consider all pleasure allowable." This is the origin of the present carnival, or *Fasching,* as it is called in the south of Germany, and which continues in that country from Twelfth Day to Ash Wednesday. The name carnival is derived from the Latin *caro, carnis,* flesh, and *vale,* farewell (according to Ducange, from the Latin denomination of the feasts in the Middle Ages, *carnis levamen,* solace of the flesh), because at that time people took leave of flesh. Previously to the commencement of their long abstinence, men devoted themselves to enjoyment, particularly during the last three days of the carnival. The carnival is nothing but the Saturnalia of the Christian Romans, who could not forget their pagan festivals. At least it greatly resembles the Saturnalia which were celebrated annually in December, with all kinds of mirth, pleasure, and freedom, in honor of Saturn, and the golden age when he governed the world, and to preserve the remembrance of the liberty and equality of man in the youth of the world. In Rome, the carnival brought to view, in a lively manner, the old Saturnalia in a new form. During the last days of the carnival, and particularly during the day which preceded the long fast, mummeries, plays, tricks, and freedom of every kind, abounded. From Italy, the modern Saturnalia passed to the other Christian countries of Europe. The wealthiest class commenced their amusements 8 or 10 days before Ash Wednesday, the middle classes 2 or 3 days, the poor only observed one day (the *Fastnacht* of the Germans). In the amusements of this period the dramatic poetry of Germany had its origin, after the cities had attained a flourishing condition. Its first traces appeared in the 13th century. The mummeries of the carnival produced the idea of adopting some character, and carrying it through. To please the multitude, and make the laugh more certain, the manners of common life were caricatured. These exhibitions afterward became more cultivated and developed. On fast eve persons in disguise sometimes went from one house to another, to make sport with their friends and acquaintances. A merry society of this kind formed a plan to represent some scene in their disguises, and hold a regular conversation at one of these mummeries. The unknown players received praises, entertainments, or presents. Encouraged by this success, the company grew stronger, their fables and speeches became longer by degrees, until they attained to regular representations of human life. It was in Nüremberg, renowned for its wares and its wit, that the first fast eve's play was produced, coarse and frolicsome, to suit the taste of the citizens. The earliest of these pieces that have come down to us date from 1450–70; they have a near relationship to the masques of the English and the farces of the French, as have the spiritual fast eve's plays, religious burlesques, to the Mysteries and Moralities. In Italy the carnival is now celebrated with the greatest show and spirit at Rome. It lasts for the 10 days preceding Ash Wednesday, certain observances taking place on certain days. Some days, for instance, are devoted to the throwing of comfits, or of small plaster pellets that take their place, these being flung from the balconies of the houses upon the persons in the streets — especially in the Corso — who retaliate in the same way, and in order that they may do this many of them are mounted upon lofty cars or other vehicles, all being masked. On other days the finest equipages move along in procession, and flowers instead of comfits are thrown. Races of riderless horses in the Corso are another prominent feature of carnival time. After sunset on Shrove Tuesday everybody carries a lighted taper (these being known as *moccoletti*), and each tries to extinguish as many others as he can while keeping his own alight. Venice, Turin, Milan, Naples, Florence, etc., also celebrate the carnival with more or less ceremony, and the same can be said of various towns of the south of France, Nice in particular. The carnival at Rome has been excellently described by Goethe. In Germany the carnival is celebrated with brilliancy only in the Catholic cities of the Rhine valley, Mayence, Bonn, but above all Cologne. In Protestant countries, generally, the feast is not observed to any extent.

Carniv'ora, broadly, those animals which prey upon other animals; but in a restricted sense, that order of mammals to which the cat, dog, bear, and seal belong. The head is small in proportion to the bulk of the body, and the skin is well covered with hair. The limbs, four in number, are fully developed, and are adapted either for walking or swimming. Two sets of teeth, deciduous or milk and permanent, are always developed in succession, and in both sets incisors, canines, and molars, are distinguishable. The order is divided into two groups, the *Fissipedia,* which include such animals as the lion, wolf, bear, etc., whose life is terrestrial; and the *Pinnipedia,* or those which are specially adapted for aquatic life.

1. *Fissipedia.*— All the carnivores of this division, except the sea-otter (*Enhydra*), have six incisor teeth in each jaw, the canine teeth are prominent, and one of the molar series in each jaw is usually compressed laterally, so as to present a cutting edge. The toes are furnished with claws, and the anterior limbs are used for seizing and holding prey as well as for walking. The skull is contracted behind the orbits, so as to give an hour-glass form when seen from above. The hollow formed by this constriction on each side of the head is bridged over by the wide zygomatic arch, and thus gives room for the powerful muscles of mastication. The lower jaw is articulated to the skull, so that it can only be moved up and down. The incisor

and canine teeth are represented by the formula $i\frac{3-3}{3-3}, c\frac{1-1}{1-1}$. The teeth behind the canines increase in size from before backwards, and vary from $\frac{4-4}{3-3}$ in the cat, to $\frac{5-5}{5-5}$ in the South African otocyon, the total number of teeth of all kinds ranging from 30 to 48. The posterior teeth are divided into premolars and molars; the last of the premolar series in the upper, and the first of the molar series in the lower jaw presenting the lateral compression and trenchant margin which earns for them the name of sectorial or carnassial teeth. Behind the carnassial the molars have tuberculated crowns. The stomach is simple and undivided, and, as a general rule, is more rounded in the flesh-eating genera. The limbs terminate in digits, which are never fewer than four, and are furnished with sharp claws, which in the *Felidæ* are retractile within sheaths of the integument on the dorsal surface of the toes. In walking, the extremities of the toes are applied to the ground, as in the "digitigrade" cat and dog; or the whole sole of the foot is put down, as in the "plantigrade" bear. The six families included under the fissipede carnivores are: (1) *Felidæ:* lion, tiger, leopard, cat, etc. These present the highest type of the carnivorous structure. The claws are retractile. (2) *Canidæ:* wolf, dog, jackal, fox, etc. The claws are not retractile, and the gape is longer. The toes in this and the previous family are five on the anterior and four on the posterior extremities; (3) *Hyænidæ:* hyæna, aardwolf, etc. The hyænas have the anterior limbs longer than the posterior, and both terminate in four toes. The skull and dentition approximate to those of the Felidæ; (4) *Viverridæ.* The supple elongated bodies of these animals are intermediate between those of the cats and the martens. Some, as the civet, gennet, zibet, have the claws retractile; in others, as the ichneumon and rasse, they are not retractile. Those mentioned are digitigrade, but the suricate of central Africa is plantigrade. In this family glands are found under the tail, the secretions of which have powerful odors. The diet of this family is not purely animal. (5) *Mustelidæ.* The members of this family have elongated bodies with short limbs, terminating usually in five-toed feet with retractile or non-retractile claws. The marten, weasel, polecat, ermine, glutton, or wolverene, constitute one sub-family of exclusively terrestrial life. The badgers, the skunks, and the like, constitute another division. (6) *Ursidæ.* In this family the carnassial tooth is no longer trenchant, but tuberculated. All are plantigrade, but the habits and aspect vary considerably, and include, besides the bears, the raccoons, panda, and several lesser forms. The raccoon and its allies are sometimes made a family with the name *Procyonidæ.*

2. *Pinnipedia.*— The aquatic carnivores comprise three families, represented by the walrus or sea-horse, the eared seals, and the common seals. They are related to the preceding families through the otters and the bears, and agree in having the extremities modified into swimming organs or flippers, and the teeth more uniform in character. See SEAL; WALRUS.

Carnivora, Fossil. The evolution of the *Carnivora* through the Tertiary Period is shown by numerous fossil species. These indicate that the modern carnivores are descended from a group of primitive *Carnivora* (see CREODONTA) of the early Eocene, and have gradually diverged from a single stock, of which the *Viverridæ*, or civets, are the nearest living representatives. From these the dogs branched out in one direction, the mustelines, hyænas, and cats in others, while the bears and raccoons are offshoots of primitive dogs. Many intermediate stages are known, between dogs and bears (as *Amphicyon, Hyænarctos*), dogs and raccoons (*Phlaocyon*), mustelines and civets (*Plesictis*, etc.), civets and hyænas (*Ictitherium*). No true *Carnivora* are found fossil in South America until the end of the Tertiary, and (with a single exception) none exist now in Australia. In both continents their place was supplied by carnivorous marsupials (see MARSUPIALS, FOSSIL), which branched out into groups more or less paralleling the true *Carnivora* of the northern hemisphere. See also BEARS; CATS; DOGS; FOSSIL.

Carnivorous Plants, plants of various genera which subsist partly upon insects and other small animals which they entrap in various ways. The apparatus in each case is a modified leaf or part of a leaf, and in some cases the modifications are so curious, so well adapted to the use to which they are put, and so perfect in action, that the plants seem almost intelligent. The object sought by these plants seems to be to supply themselves with nitrogenous food, which is generally in meagre supply where they usually live — undrained swamps. Probably, too, such plants as do not live in these habitats formerly did, but have not yet lost the use of the apparatus. A case of this kind is exhibited by the genus *Utricularia* (see BLADDERWORT). In this genus various species provided with active bladders, which act like eel-traps, live submerged in ponds; other species, also possessing active but less perfect and useful traps, live in the marshy soil of swamps. Still others live on dry ground, but these have usually abortive traps. The conclusion is that as the ponds became swamps, and the swamps were converted into dry land, the supply of nitrogenous food increased, and hence the traps became aborted, because they were no longer needed.

Probably the most nearly intelligent of these carnivorous plants is the Venus' fly-trap (*Dionæa*), found in the southeastern United States. The trap consists of two pieces hinged together. On the margins are bristles, and in the interior a few sensitive hairs, which, when touched, act like a trigger, and the apparatus closes. Should an insect cause this action the bristles will prevent its escape and the trap will remain closed until its digestion is complete, when the trap will open, cast out the indigestible portions, and be ready for another victim. If the trap fails to catch its prey, or if it be sprung by something it cannot utilize, it will open again in a short time. In the sundew (*Drosera*) the leaves are provided with glandular hairs which close over the insect that alights upon the leaf, and a glistening sticky substance holds it fast until its digestible parts are absorbed by the plant.

In the pitcher-plants (*Sarracenia, Nepenthes*, etc.), the pitcher consists of a tube either with or without a lid or hood. Around the mouth there is usually a sugary secretion which acts as a lure. The insect that alights cannot escape

Fig. 1 Lion. 2 Lioness. 3 Skull of Lion. 4 Tiger. 5 Jaguar. 6 Leopard. 7 Serval. 8 Wild Cat.

9 Skull of the Cat. 10 Lynx. 11 Skull of Lynx. 12 Spotted Hyaena. 13 Skull of Hyaena. 14 Chetah.

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Fig. 1 Aard Wolf. 2 Hunting Dog or Hyaena-Dog. 3 Wolf. 4 Skull of Wolf. 5 Dhole or
12 Zibet. 13 Ichneumon. 14 Rasse. 15 Marten. 16 Skull of

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Kholsun. 6 Jackal. 7 Brazilian Fox. 8 Common Fox. 9 Fennec. 10 Civet. 11 Genet.
Marten. 17 Weasel, 18 Polecat. 19 Otter. 20 Skull of Otter.

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because the tube is lined with hairs that force him downward to the bottom of the tube, which is usually partly filled with water. Some other genera in which the carnivorous habit is developed are *Darlingtonia, Aldrovandra,* and *Pinguicula.* Consult: Darwin, 'Insectivorous Plants.'

Carnochan, kär'nō-kăn, **John Murray,** American surgeon, famous for his bold and skilful operations: b. Savannah, Ga., 4 July 1817; d. New York, 28 Oct. 1887. He studied at Edinburgh and at various European universities; and began his practice in New York in 1847. In 1851 he became professor of surgery at the New York Medical College, and surgeon-in-chief to the State Immigrant Hospital. At one time he cured neuralgia by excising the whole trunk of the second branch of the fifth pair of nerves. In 1852 he tied the femoral artery to cure exaggerated nutrition. He also tied the primitive carotid artery on both sides, to cure elephantiasis of the neck. In 1853 he exsected the entire radius, in 1854 the entire ulna. He published a treatise on 'Congenital Dislocations,' and a translation of Rokitausky's 'Pathological Anatomy.'

Carnot, Lazare Hippolyte, lä-zär ē-pō-lēt kär-nō, French statesman, second son of the preceding: b. St. Omer, 6 April 1801; d. 16 March 1888. He was of liberal opinions, became a disciple of St. Simon, and wrote the 'Exposition générale de la doctrine Saint Simonienne,' the authorship of which was, with his consent, ascribed to Bazard. But as soon as St. Simonism assumed the form of a religious creed, Carnot parted with his friends, and became a journalist, and the chief editor of the 'Revue encyclopédique.' He was also entrusted with the publication of Grégoire's and Barère's 'Mémoires.' He was elected to the chamber of deputies in 1839, and re-elected in 1842 and 1846. After the revolution of February 1848, he was minister of public instruction until 5 July, and improved, as such, the condition of the teachers, rendered the normal schools free, and established free lectures. In 1848 he was elected to the constituant, and 10 March 1850, to the legislative assembly. After the *coup d'état* of December 1851, he left France; during his absence, he was elected a member of the *corps législatif,* but refused to take the oath. He was re-elected in 1857, but again refused to serve. He published the memoirs of his father (1860–4).

Carnot, Lazare Nicolas Marguerite, lä zär nĭk-ō-lä mär-gä-rēt, French soldier and statesman: b. Nolay, Burgundy, 1753; d. Magdeburg, 2 Aug. 1823. From his youth he exhibited an uncommon talent for the mathematical and military sciences, entered the corps of engineers, and rose in office by the favor of the Prince of Condé. He published, afterward, 'Mathematical Essays,' which caused him to be elected a member of several learned societies. His eulogy on Vauban received the prize of the Academy of Dijon. In 1791 he was appointed deputy to the constituent assembly, but at first took part only in military affairs. On his proposal the officers of the nobility were removed from the army, and others substituted from the citizens. He also proposed that implicit obedience should only be demanded of the soldier in presence of the enemy, at other times he should have all the privileges and rights of the citizen; a strange proposal to come from a military chief. As a member of the convention he voted for the death of Louis. In the following March he was sent to the army of the north, where he put himself at the head and repulsed the enemy. On his return to the convention he was made a member of the Committee of Public Safety. The influence of Carnot in the military operations now began to be more deeply felt. In possession of all the plans deposited in the archives of Louis XIV., he organized and directed the French armies; and his direction undoubtedly contributed very much to their success. After the fall of Robespierre he was often accused, but always acquitted, because his duty had been to take care of the defense of the country, and he could not be made answerable for the cruel decrees of Robespierre, in which Carnot's name, as he was a member of the committee, was of course to be found. At the establishment of the directory in 1795 Carnot was chosen a member, and for some time maintained an important influence. Barras at length succeeded him in the department of war, and was ever after his enemy. His plan for the overthrow of Barras was unsuccessful, and with some others he was sentenced to transportation on the 18th Fructidor (Sept. 4) 1797. He fled to Germany and published a defense, which was eagerly read in Paris, and by the exposure of the conduct of his former colleagues hastened their overthrow on the 30th Prairial (June 18) 1799. After the 18th Brumaire Carnot was recalled, and appointed *inspecteur aux revues,* and two months later, in April 1800, minister of war. He soon after retired into the bosom of his family, but was called to the tribunate, 9 March 1802. He often opposed the views of the government, voted against the consulship for life, and his was the only voice raised against the proposal for the imperial dignity. He remained, however, a member of the tribunate till it was abolished, passed the next seven years of his life in retirement, and published several valuable military works. In 1814 Napoleon gave him the chief command at Antwerp. He connected a vigorous defense with a careful regard for the interest of the city, which, by the command of Louis XVIII., he afterward surrendered to the British General Graham. He still retained his titles and his honors, but as a firm republican he could never expect the favor of the court; particularly as, in his memorial to the king, he openly and severely censured the measures of government, in consequence of which he was passed over in the new organization of the Academy of Sciences. When Napoleon was once more at the helm of state in 1815, he made Carnot count and peer of the empire, and pressed upon him the ministry of the interior. Carnot discharged the difficult duties of this office with his usual integrity. After the emperor's second fall he was made a member of the provisory government of France, and was afterward the only one of the members of it comprehended in the ordinance of 24 July. He retired to Cerney, where he employed his pen on political subjects; then to Warsaw with his family; and finally to Magdeburg. Among Carnot's writings the most valuable are his 'Essai sur les Machines'; 'Réflexions sur la Métaphysique du Calcul infinitésimal'; 'Sur la Géometrie de Position'; 'De la Défense des Places fortes'; 'Ex-

posé de la Conduite politique de Carnot, depuis le 1 Juill. 1814.' In Magdeburg Carnot published 'Mémoire sur la Fortification primitive,' and a volume of poems. He was rigid in his love of virtue, a scholar, a general, and an inflexible republican. He was universally esteemed, both in France and in foreign lands, and was honored by all parties.

Carnot, Marie François Sadi, mä-rē fräṅ-swä sä-dē, French president, grandson of Carnot (q.v.): b. Limoges, 11 Aug. 1837; d. Lyons, 24 June 1894. He was educated at the École Polytechnique and became a civil engineer. In 1871 M. Gambetta appointed him prefect of the Seine-Inférieure, and intrusted him with the duty of seeing to the defenses of his department, a task which he fulfilled with great ability. M. Brisson gave him the portfolio of public works in his cabinet of 1885, and in the following year he became minister of finance, retaining this post under Brisson's successor, De Freycinet. In 1887 he was elected president of the French republic in succession to M. Jules Grévy, but before his term of office had expired he was assassinated at Lyons by an Italian anarchist named Caserio.

Carnot, Nicolas Léonard Sadi, nĭk-ō-lä lā-ō-när sä-dē, French physicist: b. Paris 1 June 1796; d. there, 24 Aug. 1832. He was educated at the polytechnic school; in 1814 he entered the engineer corps, where he served until 1828, becoming captain in 1826. In 1824 he published his book, 'Reflexions sur la Puissance Notrice du Feu,' in which he laid down the principle that the efficiency of a thermodynamic engine is proportional to the amount of heat transferred from the source of heat to the condenser; and that heat passes only from a warmer to a colder body. This is called the second law of thermodynamics and is known also as Carnot's principle.

Carnotite, a mineral first described in 1899, and now one of the most important ores of uranium. It is a hydrous vanadate of uranium and potassium, its formula being, perhaps, $K_2O.\ 2U_2O_3.\ V_2O_5.\ 3H_2O$. Radium has been shown to be present in it and radiographs may be made from the crude mineral. It seems likely that it will become an important ore of radium. It is a canary-yellow crystalline powder, usually occurring disseminated through sandstone, but sometimes in earthy masses of considerable richness. Its chief locality is in Montrose County, Colo., but it has recently been reported from Utah.

Carnun'tum, an ancient Celtic town in the northern part of Pannonia, on the Danube, near where Hainburg now stands.

Caro, kä'rō, **Annibale,** Italian author: b. Citta Nuova, 1507; d. 1566. In 1543 he was appointed secretary to Pietro Ludovico Farnese, Duke of Parma and Piacenza, who entrusted him with several missions to Charles V. After the assassination of the Duke his own life was in considerable danger. He took refuge in Parma, and was treated in a friendly manner by the new Duke Octavio Farnese, whose two brothers, the cardinals, Ranuccio and Alexander, took him successively into their service. With the latter he remained from 1548 to his death in 1566, and received from him several ecclesiastical preferments. Caro devoted himself chiefly to the study of numismatics and the Tuscan language, and his pure and elegant style in verse and prose soon became generally admired. His translation of the Æneid in blank verse is excellent. After his death appeared a translation by him of Longus, and of Aristotle's 'Rhetoric'; also 'Rime' (1569), and 'Lettere familiari' (1572–5), the former of which are admired for the elegance of the verse, and the latter as models of beautiful Italian prose.

Caro, Elme Marie, ĕlm mä rē kä-ro, French philosopher: b. Poitiers, 4 March 1826; d. 13 July 1887. He was a lecturer at the École Normale of Paris in 1857, professor at the Sorbonne 1867, and a member of the French Academy in 1876. He was one of the popular lecturers of his day and his lectures in defense of the Christian religion were largely attended, being especially popular with women. He published 'L' Idée de Dieu et ses nouveaux Critiques'; 'La Philosophie de Goethe'; 'La Materialisme et la Science'; 'Etudes Morales sur le Temps présent'; 'Nelanges et Portraits.'

Caro, Jakob, yä kōb kä'ro, German historian: b. Gnesen, 2 Feb. 1836. He was educated at Berlin and Leipsic, traveled in Galicia and southern Russia, and in 1863 became lecturer at the University of Jena and later professor; in 1868 he was professor at Breslau. He has written 'Das Interregnum Polens 1856' (1861); 'Liber Cancellariæ Stanislai Ciolek' (1871–4); 'Lessing und Swift, Studien uber Nathan den Weisen' (1869); 'Aus der Kanzlei Kaiser Siegsmunds' (1879); 'Das Bundniss zu Canterbury' (1880); 'Beata und Halszka, eine Polnisch-Russische Geschichte aus dem 16. Jahr hundert.' (1880); and a continuation of Röpell's 'Geschichte Polens.'

Caro, Miguel Antonio, mē-gĕl' än-tō'nē-ō, Colombian prose-writer and poet: b. Bogotá, Colombia, 10 Nov. 1843. He has been an editor and contributor to periodicals. His principal works are 'Poems' (1866); 'Hours of Love,' a prose work; and a translation into Spanish verse of Virgil's complete works (3 vols. 1873–5). He is a correspondent of the Royal Spanish Academy, and in 1886 was national librarian in the Colombian Congress.

Carob, kăr'ŏb, or **Algaro'ba-bean** (*Ceratonia siliqua*), a leguminous plant of the suborder *Cæsalpineæ*, growing wild in all the countries bordering the Mediterranean, and more especially in the Levant. It has a dark-green foliage, and produces pods in which the seeds are embedded in nutritious pulp, of the taste and consistence of manna. The names "locust" and "St. John's bread" have been given to the legumes of this plant, from an idea that they were the food eaten, along with wild honey, by the Baptist in the wilderness. The legumes are sometimes imported into this country as food for horses, this being their principal use in the south of Europe and the north of Africa, where the plant is cultivated. Singers are said to chew the seeds for improving the voice.

Caröe, kä'rō, **William Douglas,** English architect of Danish parentage: b. Liverpool, 1857. He was educated at Trinity College, Cambridge, and studied architecture with the eminent architect, John L. Pearson. He is architect to Southwell Cathedral and to the Diocesan societies of Lichfield and Derbyshire, as well as to the dean and chapter of Canter-

bury. Among his principal works are the archbishop's palace at Canterbury, bishop's palace at Bristol; St. David's Church at Exeter; Wycombe Abbey School; and the Jubilee Monument to Queen Victoria at Mentone, France. He has also restored many buildings of historic interest.

Carol, a song of praise sung at Christmas or Easter. It originally meant a song accompanied with dancing, in which sense it is frequently used by the old poets. It appears to have been danced by many performers, by taking hands, forming a ring, and singing as they went round. It has been said that the oldest carol was that sung by the heavenly host when the birth of the Saviour was announced to the shepherds on the plains of Bethlehem. It is probable that the practice of singing carols at Christmas-tide arose in imitation of this, as the majority of the carols declared the good tidings of great joy; and the title of Nöels, nowells, or novelles, applied to carols, would seem to bear out this idea. Carol singing is of great antiquity among Christian communities, as the carol by Aurelius Prudentius, of the 4th century, will show.

Carolan, kär'ō lăn, **Turlogh,** Irish musical genius: b. near Nobber, County of Westmeath, about 1670; d. 1738. Having lost his sight when a child, he studied the harp, and in after life not only maintained himself thereby, but even became famous.

Carolanos, kä-rō-lä'nōs, a heathen tribe of the Philippines, living in the mountain lands of the island of Negros, especially the Cordillera of Canyan. They are of Malayan stock and may be identical with the Buquitnon, though that cannot be determined. Practically nothing is known of them.

Caroli, Pietro Francesco, pē ā trō frănchēs'kō kä'rō lē, Italian painter: b. Turin 1638; d. 1716. He studied painting at Venice, Florence, and Rome, and was professor in the Academy of Rome at his death. He is celebrated for his careful execution and beautiful coloring, and excelled particularly in perspective, of his skill of which he has left excellent specimens in his drawings of the interior of some of the Roman churches.

Carolina, kä-rō-lē'na. This name is generally given to a famous law of the German Empire, of the year 1532, under Charles V., which he himself called an ordinance of criminal procedure (*Peinliche Gerichtsordnung*). From him it was at a later period called *Constitutio criminalis Carolina,* or shortly *Carolina.* The arbitrary administration of justice, the disorder and cruelty which had become customary in the courts of Germany, where many a process was begun and ended with torture, and persons were sentenced even to death without regular process, gave occasion to this law. From the beginning of the peace of the land the necessity of such a law was felt throughout the country; but it was difficult in this, as in all other cases, to make the different members of the empire agree on one general measure. The Baron Johann von Schwarzenberg was chiefly instrumental in introducing this ordinance. He became minister of state of the Prince-bishop of Bamberg, and succeeded in procuring an ordinance of criminal procedure for Bamberg to be drawn up and published in 1507. The same was also adopted in 1510 by the margrave of Brandenburg and Franconia; and at last a law of criminal procedure for the empire at large was passed by the diet at Ratisbon, in 1532. The Carolina contains 219 articles, which regulate the standing and oaths of judges, the character of witnesses, the penalties of different crimes, and the circumstances in which torture at that time common in criminal jurisprudence should be applied. Several German princes, as the elector of Saxony, the elector of Brandenburg, and of the palatinate, protested against it, in order to protect the laws of their states and their own privileges against the legislative power of the emperor; but at last the Carolina was established in almost every part of the empire. From the connection of Switzerland with Germany, and the fact that several Swiss towns were imperial cities, German laws frequently passed into Switzerland, and the Carolina became the law by which even the Swiss troops in the service of the kings of France were governed until the French Revolution.

Caroli'na Allspice. See CALYCANTHUS.

Carolina, Original Constitution of. For many years after the subversion of the old English order by political and religious insubordination, 1642–60, the dominant idea of the conservatives was to prevent its recurrence, as with the conservatives after the French Revolution; and their chief dread was of republicans and dissenters. It is an almost grotesque incident of this reaction, that by far its narrowest embodiment came from a liberal philosopher and an unbelieving incendiary politician,—John Locke and Lord Shaftesbury (Anthony Ashley Cooper). A group of eight noblemen, headed by the famous Lord Clarendon, and including Shaftesbury, were granted on 24 March 1663, a tract called the province of Carolina, after Charles II.; as extended 30 June 1665, it included the present North and South Carolina and Georgia, and in theory stretched west to the Pacific. "To avoid erecting a numerous democracy," in their own words, they had Locke, who was Shaftesbury's secretary, draw up (whether on his own lines or Shaftesbury's is a moot point) a form of government called the "Fundamental Constitutions," which is a classic for impractical absurdity even among Utopias. The mass of the people (not alone, be it remembered, the future immigrants, but a considerable population already living there in pure democracy) were to be hereditary "leet-men," or serfs of the soil. Next above them was a sort of upper middle-class commons called "lords of the manor," who could let out 10-acre tenant farms. Over both (as the charter gave the proprietors the right to create titles of nobility other than English ones) were a fantastic self-perpetuating colonial *noblesse,* of "landgraves" and "caciques." Crowning the whole were the proprietors; the eldest was "palatine" or viceroy, the others were admiral, chamberlain, high constable, chief justice, chancellor, high steward, and treasurer. The "leet-men" held three fifths of the land; the nobility and "lords of the manor" one fifth, not to be alienated after 1700; the proprietors the remaining fifth. The province was divided checkerboard fashion into squares, first of counties; then each county into eight "signeries" for the proprietors, eight

"baronies" for the nobility (each signory and barony to contain 12,000 acres, perpetually annexed to the title), and four "precincts," and each precinct into four "colonies" for the serfs. There was a Parliament; but the commons were carefully kept powerless by giving them only 14 members out of 50, making only freeholders of 500 acres eligible to seats, and electing them for life; with the further proviso that landgraves could sit in either house at will, and vote on the same measures in both. All initiative was in a supreme executive council, which prepared and submitted all legislation to Parliament; and the proprietors had a veto on all. Each proprietor had a superior court at which he presided in person or by proxy; each nobleman held a court-leet for his barony, and there were precinct courts. The laws were worthy of this closet constitution. The English Church was established and supported by public taxation, in a province inhabited largely by Quakers, and the rest by Scotch Presbyterians, Huguenots, Luthcrans, etc. No one could live or hold property in or be a freeman of the province who did not acknowledge God, and that he is to be publicly worshipped. Every person above 17 not a member of some church, or who did not subscribe the "Fundamental Constitutions" and promise in writing to defend and maintain them, should be an outlaw. There was a severe censorship of the press, of ceremonies, of fashions, and of sports, in the hands of the nobility. Paid lawyers were prohibited; thus compelling the commons to put themselves under a relation of "clientage," in Roman fashion, to the nobility to avoid ruin. All commentaries on the constitution or laws were forbidden. This constitution was to replace one under which the people were ruled by a council of 12, chosen half by the proprietors and half by the Assembly; that Assembly consisting of 12 elected freeholders, so that the people had 18 out of 25 votes; with entire freedom of religion, civil marriage, security for five years from suit on cause arising outside of the country (for protection of emigrant debtors), exemption from taxation for the first year, and no political or social superiors anywhere. That is, free Englishmen in virtual democracy were to become at a blow the serfs and villeins of the time of the Norman Conquest. The proprietors bound themselves by solemn compact to maintain this incredibly foolish instrument as unalterable forever, and evidently expected men to emigrate to a savage wilderness on such terms. Five successive forms of this constitution were promulgated before its entire abandonment in 1693, each in turn proclaimed permanent and unalterable; and the result, especially in Albemarle County (afterward North Carolina), was simple anarchy. The people set them utterly at naught; and while the former system had been legally abolished, it continued in force by suffrance. Resistance to law as a first principle of life became ingrained in them; and the character of the colony was long and deeply injured by the quarter-century of attempt to force its people, new and old, into this iron mold of extreme feudalism. For further history, see NORTH CAROLINA; SOUTH CAROLINA.

Carolina-pink, Maryland Pinkroot, or **Worm-grass,** names given to the *Spigelia marilandica,* a plant of the order *Loganiaceæ,* bearing scarlet flowers, and having a root used as a vermifuge. It occurs in rich woods, and extends from New Jersey, west, north, and south, to Wisconsin and Texas.

Carolina Ridge, in geology, the name given to an elevation of the bottom of the Atlantic Ocean off North Carolina, that occurred in Miocene time. It deflected the Gulf Stream and caused a great change in climate along the Atlantic coast. See MIOCENE; TERTIARY.

Car'oline Amelia Elizabeth, Queen of England, wife of George IV., king of Great Britain and Hanover, second daughter of Duke Charles William Ferdinand of Brunswick: b. 17 May 1768; d. London, 6 Aug. 1821. She was married to the Prince of Wales, afterward George IV., in 1795. After the birth of her daughter, Charlotte Augusta (7 Jan. 1796), her husband abandoned her, declaring that no one could force his inclinations. This was the beginning of the disgraceful dispute between the two parties, which lasted till the death of Caroline, and exposed her honor to repeated accusations from her husband. The Princess of Wales lived retired from the court, at a country-seat at Blackheath, till 1808. In 1813 the contest was renewed between the two parties, the Princess of Wales complaining, as a mother, of the difficulties opposed to her seeing her daughter. In 1814 the princess obtained permission to go to Brunswick, and afterward to make the tour of Italy and Greece, in which the Italian Bergami was her confidant and attendant. Many infamous reports were afterward circulated, relating to the connection between the Princess and Bergami. When the Prince of Wales ascended the throne, 29 Jan. 1820, he offered her an income of £50,000 sterling, on condition that she should renounce the title of Queen of England, and every title appertaining to that dignity, and should not again return to England. She refused the proposal, returned to England, 5 June, and the next day entered London amid public demonstrations of welcome. She was now tried for adultery, but not convicted, and in this trial Brougham acted as the queen's attorney-general. Though banished from the court, the queen still lived at Brandenburg House, maintaining a style suitable to her rank. She was refused admission to Westminster Abbey on the occasion of the coronation of her husband, on 19 July 1821, and published a protest in the newspapers. Her tomb at Brunswick has a very short inscription, in which she is called the unhappy queen of England.

Caroline Matilda, Queen of Denmark, daughter of Frederick Louis, Prince of Wales: b. 1751; d. Celle, Hanover, 10 May 1775. She was married in 1766 to King Christian VII. of Denmark. She became the object of court intrigues caused by the jealousy of the grandmother and stepmother of her husband. These led to the execution for treason of Counts Struensee and Brandt, who were of the queen's party, and to the imprisonment of the queen herself, who was liberated through the interference of her brother, George III. of England. Her last hours are described in a small work, 'Die letzen Stunden der Königin von Danemark.'

Caroline, The, an American steamboat used in 1837 by the American sympathizers with the Canadian insurgents under William Lyon Mackenzie (q.v.). The latter, after years of agitation, had gathered a band of insurgents in December, and attempted to seize Toronto,

capture the lieutenant-governor and his cabinet, and proclaim a republic. He was defeated, and fled to Navy Island on the British side of the Niagara River. Some hundreds of American sympathizers joined him, and he set up a "provisional government," issued paper money, and offered bounties for volunteers and a reward for the apprehension of the lieutenant-governor. On 29 December an American steamer, the Caroline, crossed over to his camp from Schlosser on the American side, laden with reinforcements, provisions, and munitions; and returning, lay at Schlosser that night full of men presumably ready for a similar trip the next day. The Canadians, incensed at this outrageous violation of neutrality, sent over an armed party in boats to enforce it. They boarded the Caroline, hustled the passengers and crew ashore, killing one man (Amos Durfee) on shore in the fray, towed the vessel out into the stream, set it on fire, and sent it over Niagara. A great uproar ensued. President Van Buren issued a proclamation ordering the neutrality laws to be respected, and, calling out the militia under Winfield Scott, he then demanded reparation from the British government. The latter naturally showed no great alacrity in responding. Shortly afterward, one Alexander McLeod came over to the American side, boasting that he was one of the boarding party and had killed one of the Caroline's men with his own hand. He was arrested, indicted by the grand jury for the murder of Durfee, and imprisoned to await his trial. Fox, the English minister, demanded his release; the secretary of state (Forsyth of Georgia) replied that he was in the hands of justice in New York State, and must await its course; Lord Palmerston thereupon assumed for the English government full responsibility for the assault on the Caroline, and again demanded his release. But Fox in his letter curiously added that the government had every reason to believe that McLeod was not one of the boarding party; in which case, of course, he was either a mendacious braggart or a common murderer, and the matter of the Caroline was irrelevant. Webster, now secretary of state, replied, ignoring this point, that if the case were in a Federal court the President would order a *nolle prosequi* entered; but it being in a State court, he could only await its action, and if it did not discharge McLeod, the case should go up to the United States supreme court. In the July term of 1838 a writ of *habeas corpus* was sued for in the New York supreme court, but refused. McLeod was acquitted, however, and the whole affair dropped.

Caroline Books, or **Libri Carolini,** a theological work in four books, prepared under the direction of Charlemagne (Carolus Magnus), in connection with the disputed question of image worship that seriously agitated the Church during the reign of that monarch. The second synod of Nicæa had given its approval to the use of images, agreeing in this point with the views of the Eastern Church. Owing to a misunderstanding of the Nicæan canons through a bad translation, which seemed to make the Eastern synod declare that the worship due to God alone, *latria,* should be paid to images, the 'Libri Carolini' severely reviewed the doctrine. The condemnation of image worship as formulated in the Caroline Books does not, however, bear upon the inferior honor, *dulia,* paid to the saints and their images, or that given to the Virgin, *hyperdulia.*

Caroline Islands, a large archipelago in the North Pacific Ocean, between lat. 3° and 12° N., and lon. 132° and 163° 6′ E., and between the Philippines and the Marshall isles. Area, about 560 square miles. It contains many groups, embracing in all about 500 islands and islets. Many of them are mere coral reefs, little elevated above the ocean. The most westerly group is the Paloas, or Pelew Islands, which contain seven large and many small ones, all of coralline formation. The next group, Yap or Gouap, lies northeast of the last. In its chief island, which is mountainous, precious metals have been found. The other principal groups are Lutke, Mortlock, Siniavin, Enderby, and Hogoleu. The most easterly island is Ulalan. The most important vegetable productions are palms, bread-fruit trees, and bananas. The inhabitants, numbering about 35,000, though mainly Micronesians, include various races, and have made very different degrees of progress in civilization. In the central groups they are of a handsome physical type, active and industrious, and have some commerce. On the east generally, and on the west, with the exception of the Pelew Islands, the inhabitants, though apparently of the same stock, are far less advanced. The islands were discovered in 1527 by the Portuguese, who gave them the name of Sequeira. In 1686 they were annexed and renamed in honor of Charles II. by the Spaniards, who soon changed the name to New Philippines. After several futile missionary attempts in the 18th century, Spain took little active interest in the group until August 1885, when the German flag was raised over Yap. A serious dispute followed this act, and the question being submitted to the Pope as arbitrator, he decided in favor of Spain, reserving special trade privileges to Germany. In 1887 disturbances broke out at Ponapé, in which the governor, who had arrested one of the American Protestant missionaries, was killed by the natives; but the rising was soon suppressed. In February 1899 Germany purchased from Spain for about $3,300,000 the Caroline and Pelew islands, and all of the Ladrones, but Guam, which had been ceded to the United States in the treaty of peace that ended the Spanish-American war.

Carolingians. See CARLOVINGIANS.

Carolus-Duran, Auguste Émile, ā-mēl kā-rō-lüs-dü-rāṅ, French portrait painter: b. Lille, 4 July 1837. His name was originally Charles Auguste Émile Durand. He was a pupil of Suchon, and received the medal of honor at the Salon of 1819. Ten years later he was created commander of the Legion of Honor. He is a brilliant colorist, and as a painter of women has long been a favorite. Many American artists have studied under him in Paris. Among characteristic works of his are 'La Prière du Soir' (1863); 'The Lady with the Glove'; and portraits of Émile Girardin; Queen Maria Pia, of Portugal; Countess of Warwick; and Duchess of Marlborough.

Carolus, a gold coin struck in the reign of Charles I., and originally 20 shillings in value, afterward 23 shillings. The name was given also to various other coins.

Carora, kä-rō'rä, Venezuela, a city of the state of Lara, situated 95 miles south of Coro on a tributary of the Tocuyo River. It was founded by the Spaniards in 1572. It has a considerable trade in gums, rubber, and cochineal, and the raising of cattle mules is one of the chief industries. Pop. 8,000.

Carotid Artery, either of the two great arteries which convey the blood from the aorta to the head and the brain. In the article on the aorta (q.v.) the origin of the carotid arteries is described,— that from the right side springing from the innominate artery to supply most of the right side of the head; that on the left side arising directly from the aorta to supply all of the structures of the left side of the head. Apart from these slight variations in their origin on the two sides, the carotid arteries and their branches are practically duplicated in the two halves of the head. Thus the main branches, the common carotids, soon branch into two, the external and internal carotids. This division takes place about at the level of the thyroid cartilage. The external carotid supplies the upper part of the front and side of the neck, the tongue, larynx, pharynx, face, the pterygoid regions, the upper part of the back of the neck, the scalp, and the major portions of the brain membranes. The internal carotid soon enters the skull and supplies the greater part of the brain tissue, the orbital structures (the eye, etc.), and portions of the brain membranes. The branches of homologous arteries of the two sides anastomose somewhat, although many of the arteries of the brain are terminal arteries and do not anastomose. Occlusion of one of these vessels in the brain usually results in permanent injury. In deep cuts of the throat these arteries may be involved, but they lie very deep as a rule and are not often severed. (Morris, 'Anatomy'; Gray, 'Anatomy.')

Car'otin (Lat. *carota,* "a carrot"), the coloring-matter of the carrot. Its formula is doubtful, for although carotin appears, from such analyses as have been made, to be a simple hydrocarbon, no other strongly colored hydrocarbon is known, and hence the probability is that oxygen is also an essential constituent. It may be extracted from the chopped carrot by the action of carbon disulphide, in which (as also in benzene) it is very soluble. It crystallizes in small, red plates, which are insoluble in water and in alcohol. A similar compound, called "hydrocarotin," is also known.

Carotto (kä-rō'tō) **Family.** 1. GIAN FRANCESCO, jän frän-chĕs'kō, Italian painter: b. Verona, 1470; d. there, 1546. He studied under Liberale at Verona and under Andrea Montegna at Mantua. His earlier productions are in imitation of the style of Montegna; but at a later period the study of the works of Leonardo da Vinci and Raphael produced a decided change. Carotto is not distinguished by the grandeur of his conceptions, but excels in character and expression, and in the softness and the warmth of coloring. Verona contains most of his works. Among these is the 'History of Tobias,' a series of pictures in the church of Saint Eufemia. 2. GIOVANNI, jō-vän'nē, Italian painter: d. 1555. He was the brother of Gian, and his pupil. He was chiefly an architectural painter and is celebrated for his copies of ancient ruins. He is also said to have given instruction to Paul Veronese.

Carouge, Switzerland, a town of the canton of Geneva, on the left bank of the Arve, opposite Geneva, with which it is connected by a bridge. It has machine-works, foundries, dye-works, and manufactures of watches. It was ceded to Switzerland in 1816, until which time it had been the capital of the Sardinian province of Carouge, which was suppressed in 1837. Pop. (1902) 7,500.

Carp, a name applied to many fishes belonging to the *Cyprinidæ.* The members of this family inhabit fresh waters, and are extremely numerous in genera, species, and individuals. It is estimated that there are more than 1,000 species. One group of the family, found in North America, includes fishes known as suckers, buffalo-fishes, redhorses, and mullets, while another group contains the minnows, dace, fatheads, chubs, etc. They are all soft-finned fishes, with a stout, serrated spine, which stands in front of both the dorsal and the anal fins. There are no teeth in the mouth, but they are developed in the pharyngeal bones; that is, in the throat. The flesh is not of the best quality, and is full of fine bones. The name carp is especially applied to one fish — *Cyprinus carpio.* This was introduced into North America from Europe by the United States Fish Commission, but it came originally from Asia. It inhabits our streams and lakes, where it is increasing rapidly in numbers. It reaches a length of two feet and may attain a weight of 40 pounds. It is a scaly, compressed, robust fish, with well-developed barbels and dorsal fin, and a short anal, and is of a brownish hue. Owing to its hardiness, its durability under extreme temperatures, the facility with which it may be raised because of its adaptability to sluggish ponds and swampy lakes, it might form an important element in the fish food-supply of the North American interior, since farmers can raise it easily in their mill-ponds. It feeds upon vegetable fare, larvæ, insects, etc., and during the winter months hibernates, at which time it requires no food. The eggs, also, are very hardy, and number several hundred thousands to each individual. They adhere to aquatic grasses and weeds.

The carp is usually covered with large scales; but one variety of it, the "mirror carp," has only a few large scattered scales; while another species, the "leather carp," is wholly without scales. (Consult the publications of the United States Fish Commission.)

Carp-sucker, a common and little-valued fresh-water fish of the genus *Carpiodes,* related to the buffalo-fishes and suckers. It is found throughout the central part of the United States, takes its name from its carp-like form, averages about two feet in length, and is a dull green above, grading into silver beneath.

Carpaccio, Vittore, vē tō rā kär-pä'chō, Italian artist: b. Istria, about 1450; d. 1525. He was one of the most celebrated masters of the old Venetian school, and was the rival of Bellini and the last Vivarino. All that is known of his life is that he belonged to Venice. of which he has reproduced in the back-ground of his pictures the streets and monuments. His distinguishing characteristics are natural expression, vivid conception, correct arrangement,

and great variety of figures and costumes. He also excelled as an architectural and landscape painter. His favorite employment was the dramatic representation of sacred subjects, several of which he has illustrated by a series of paintings. Of these the most celebrated are the histories of St. Ursula and St. Stephen. The former, consisting of nine pictures, is now in the Academy at Venice, and has been engraved; the latter, in five pictures, is in Paris, Milan, and Berlin. The 'Madonna and Child Enthroned,' supposed to be an earlier production, is in the National Gallery, London. BENEDETTO, CARPACCIO, a son or grandson of the above, flourished about the middle of the 16th century, and is known for a fine painting of the 'Coronation of the Virgin' in the church of Capo d'Istria.

Carpani, Giuseppe, joo sĕp'pē kär-pä'nē, Italian dramatist and writer on music: b. Villalbese, near Milan, 28 Jan. 1752; d. Vienna, 22 Jan. 1825. Having prepared for the profession of the law, he afterward devoted himself to literary pursuits, and produced a great number of plays and operas partly translations and partly original. In 1792 he was editor of the 'Gazzetta di Milano,' and wrote violent articles against the French Revolution. He was obliged to leave the city after the invasion of the French, and went to Vienna, where he was appointed censor and director of the theatre. In 1809 he accompanied the Archduke John in the expedition against Napoleon. Under the title of 'Haydine,' he published a series of curious and interesting letters on the life and works of his friend Haydn, the composer. These letters, published in a French translation as an original work by L. A. C. Bombet, or, as other biographers state, by Beyle (known under the *nom de plume* of Stendhal), gave rise to a great literary controversy, in which Carpani vindicated his authorship most successfully.

Carpa'thian Mountains, a range of mountains in central Europe, forming for the greater part of their extent a natural boundary of Hungary, in the shape of a semicircular belt of nearly 800 miles in length, extending from Orsova on the Servian frontier, to Presburg. Its breadth is considerable, reaching a maximum of 240 to 250 miles, between the Banat and Transylvania. The Carpathian chain may be divided into two great sections, the East and the West Carpathians, the former curving from the mouth of the Nera to the source of the Theiss, and forming the boundary between Austria and Rumania; the latter proceeding from the sources of the Theiss and the Pruth, and terminating on the banks of the Danube west of Presburg, and forming the boundary between Hungary and Galicia. To the western Carpathians belongs the remarkable group of the Tatra, in which is situated the culminating summit of the whole system, the Gerlsdorf Peak, 8,737 feet. Several other peaks exceed 8,000 feet. The loftiest summit of the eastern Carpathians reaches an elevation of 8,318 feet. The most remarkable and frequented passes are those of Teregova, leading from Orsova to Temeswar; of Vulkar, forming the valley in which the Schyl flows; and of the Rothenthurm, in a gorge formed by the Aluta at the foot of Mount Szurul. The outer bend of the Carpathians is much steeper than that which descends toward the valleys of Transylvania and Hungary. The only important rivers which actually rise in the chain are the Vistula, the Dniester, and the Theiss. The formation of the Carpathians took place mostly in the Tertiary period, and was practically completed at the end of the Miocene. The eastern part of the Carpathian chain, from Orsova to the source of the Burcza, near Kronstadt, is entirely composed of primitive rocks. These are succeeded by grauwacke, which extends to the sources of the Theiss, and is only interrupted by a primitive group between the pass of Borgo and the source of the Viso. A great chain of trachyte appears on the frontiers of the Bukowina, and stretches to the point where the Aluta begins to flow southwest. To the west of this chain, on approaching the plains, an extensive tract of sandstone belonging to the coal formation begins to appear, and covers the greater part of Transylvania. Tertiary formations surround the vast plains of Hungary, which consist of a rich alluvium, and must once have been the bed of a lake. Basalt frequently occurs, but no distinct traces of extinct volcanoes have been found. The Carpathian range is rich in minerals, including gold, silver, quicksilver, copper, and iron. Salt occurs in beds, which have sometimes a thickness of 600 or 700 feet, and are apparently inexhaustible. On the plateaus corn and fruit are grown to the height of 1,500 feet; higher up the mountain steeps are covered with forests of pine, some of them as high as 5,500 feet. About 6,000 feet seems to be the vegetable limit. Above it a few lichens may be found, but in general nothing is seen but bare, steep rocks, many of them in the form of conical peaks.

Carpathos, kär'pa thŏs, an island in the Ægean Sea, now called Skarpanto. It is now under Turkish rule; in ancient times it belonged to Rhodes.

Carpeaux, Jean Baptiste, zhŏn bäp'tēst kär-pō, French sculptor: b. Valenciennes, France, 14 May 1827; d. Courbevoie, near Paris, 12 Oct. 1875. He studied at the School of Architecture in Valenciennes, and later went to Paris, becoming a pupil of Rude and of Duret. In 1854 he obtained the Prix de Rome. His bronze 'Neapolitan Boy' attracted notice; and 'Ugolino and His Four Sons' (1863), also in bronze, though it defied the canons of sculpture, made him famous. He settled in Paris in 1862. His masterpiece, a marble group, 'The Dance,' in the façade of the New Opera in Paris, fully showed his dramatic power and the exuberance of his imagination; but it provoked much hostile criticism as involving an attempt to stretch beyond their natural province the limits of the plastic art. The most notable of his later works is the great fountain in the Luxembourg Gardens.

Car'pel, the leaf forming the pistil. Several carpels may enter into the composition of one pistil.

Carpenta'ria, Gulf of, a large gulf indenting the northern coast of Australia, named for its discoverer, Pieter Carpenter. Cape York Peninsula, the northern extremity of Queensland, is on the east, and Arnhem Land on the west. It contains a number of islands, among them Groote Eylandt, Sir Edward Pellew Islands, and Wellesley Islands. Its maximum width is about 400 miles, and its length 460 miles. The land around is generally low.

Carpenter, Charles Carroll, American naval officer: b. Greenfield, Mass., 27 Feb. 1834; d. 1 April 1899. He was promoted commodore 15 May 1893, and rear-admiral 11 Nov. 1894; was commander-in-chief of the United States Asiatic squadron from 27 Aug. 1894, till 9 Nov. 1895; and was retired on reaching the age-limit, 28 Feb. 1896. During the summer of 1895 he rendered invaluable service in China in protecting American missionaries and in co-operating with United States Minister Charles Denby and the British and Chinese authorities to preserve peace, particularly after the Kucheng massacre.

Carpenter, Edmund Janes, American journalist: b. North Attleboro, Mass., 16 Oct. 1845. He was for many years on the editorial staffs of Providence, New Haven and Boston papers, and has published 'A Woman of Shawmut: a Romance of Massachusetts Bay Colony, 1640' (1892); 'America in Hawaii' (1898).

Carpenter, Edward, English socialistic writer: b. Brighton, England, 20 Aug. 1844. He was educated at Trinity Hall, Cambridge, and was for some time Fellow and lecturer there, as well as curate under the noted F. D. Maurice. In 1874 he gave up his fellowship and left the ministry, and until 1881 lectured on science and music in university extension work. He has since devoted his time to literary work, market gardening, and socialist propaganda. In 1884 he visited the United States in order to meet Walt Whitman. He has published 'Towards Democracy'; 'Love's Coming of Age'; 'Angels' Wings'; 'Adam's Peak to Elephanta'; 'Iolaus: an Anthology of Friendship.'

Carpenter, Esther Bernon, American prose-writer: b. Wakefield, R. I., 1848; d. 1883. She contributed to magazines; published 'The Huguenot Influence in Rhode Island'; and 'South Country Neighbors' (1887).

Carpenter, Francis Bicknell, American painter: b. Homer, N. Y., 6 Aug. 1830; d. New York, 23 May 1900. He studied with Sanford Thayer at Syracuse, N. Y. (1844), and in 1852 became an associate of the National Academy. Among his works are a portrait of President Fillmore, in the City Hall, New York; a portrait of President Lincoln, in the capitol at Albany, N. Y.; and the 'Emancipation Proclamation' (1864), in the capitol at Washington. While executing the last-named painting he was closely associated with President Lincoln, and his observations during this period are embodied in his book entitled 'Six Months in the White House with Abraham Lincoln.'

Car'penter, Frank George, American journalist: b. Mansfield, Ohio, 8 May 1855. He has been connected with various newspapers, and has made several important newspaper tours. He has published a series of geographical readers; 'Through Asia with the Children' (1898); 'Through North America with the Children' (1891); 'South America: Social, Industrial and Political' (1900).

Carpenter, George Rice, American literary critic: b. off the coast of Labrador, 25 Oct. 1863. He was graduated from Harvard University in 1886, and subsequently studied in Paris and Berlin. He was instructor at Harvard, 1888–90, professor of English in the Massachusetts Institute of Technology, 1890–3, and professor of rhetoric at Columbia University from 1893. He has written a 'Life of John Greenleaf Whittier' (1902); 'Elements of Rhetoric and Composition'; 'Life of H. W. Longfellow'; 'Principles of English Grammar.'

Carpenter, Gilbert Saltonstall, American military officer: b. Medina, Ohio, 17 April 1836. He was graduated at Western Reserve College in 1859; was admitted to the bar in 1861, and immediately afterward entered the Union army with the 19th Ohio Volunteer Infantry. Soon afterward he was transferred to the 18th United States Infantry, with which he served through the Civil War, in which he received the brevet of captain for gallantry in the battle of Stone River. Subsequently he rendered service in various Indian campaigns; was commissioned a brigadier-general of volunteers in the war with Spain in 1898; and became colonel of the 18th United States Infantry, 20 June 1899. His volunteer appointment was made in recognition of his gallantry at El Caney, Cuba. He retired in January 1900.

Carpenter, Henry Bernard, Irish Unitarian clergyman: b. Dublin, Ireland, 22 April 1840; d. Sorrento, Maine, 17 July 1890. He was a brother of William Boyd Carpenter (q.v.), bishop of Ripon, and was educated at Oxford University. He was for a time chaplain to the Earl of Belmore. He subsequently became a Unitarian, and coming to the United States in 1874 was pastor of the Hollis Street Church in Boston, 1878–87. He published 'Liber Amoris,' a volume of verse, and after his death a collection of his poems was edited by J. J. Roche (q.v.). He was a brilliant speaker and very popular as such.

Carpenter, Joseph Estlin, English Unitarian scholar: b. Ripley, Sussex, 5 Oct. 1844. He was educated at University College, London, and Manchester New College (now at Oxford). He was minister of Oakfield Road Church, Clifton, 1866–9, and of Mill Hill Chapel, Leeds, 1869–75, and is now vice-principal of Manchester New College, and Case lecturer on comparative religion there. He is one of the very foremost living authorities as a Sanskrit scholar and biblical critic, and besides editing Ewald's 'History of Israel' (Vols. III.–V.), and translating Tiele's 'Outlines of the History of Religion,' is the author of 'Life and Work of Mary Carpenter' (1879); 'Life in Palestine'; and 'The First Three Gospels: Their Origin and Relations' (1890). With Rhys Davids he has edited the 'Sumairgala Vilasini' (1886); and the 'Digha Nikaya' (1889). With Harford-Battersby he has also edited the Hexateuch according to the revised version.

Carpenter, Lant, English Unitarian clergyman: b. Kidderminster, 2 Sept. 1780; d. at sea, 5 April 1840. Designed for the ministry, he was sent in 1797 to the Northampton Academy. That school being temporarily discontinued, young Carpenter was placed at Glasgow College, where, however, he did not continue the length of time necessary to take his degree. Leaving college in 1801, he spent some time in teaching, and as librarian of the Athenæum, Liverpool. At Liverpool, Carpenter's views were so clearly in sympathy with those of the Unitarian denomination generally, that he received several invitations to the pastoral charge of Unitarian congregations, and a call to a professorship in

their college at York. In 1805 he accepted a call to Exeter, where he continued for 12 years. In 1806, the University of Glasgow gave him the degree of LL.D., although he had applied only for the degree of M.A. From Exeter he removed to the pastoral charge of the Unitarian congregation at Bristol (1817), where he continued until his death, which occurred by falling from a vessel between Naples and Leghorn, while on a tour for his health. Dr. Carpenter's piety was of an eminently practical turn. The instruction of children was an object of constant interest. Amid all his pastoral and literary labors he always found time and energies to devote to juvenile instruction, and, even against the prejudices of his congregations, established Sunday-schools among the children of Exeter and Bristol. In his pastoral charges at Exeter and Bristol, he was active in co-operation with others in the establishment of libraries, schools, savings banks, and institutions for general improvement and welfare. His published works are mainly theological and doctrinal, in support of the Unitarian sentiments he had early espoused. Among his more important works are 'An Introduction to the Geography of the New Testament'; 'Unitarianism the Doctrine of the Gospel'; 'Examination of the Charges Against Unitarianism'; 'Harmony of the Gospels'; and a volume of sermons. Mild in controversy, faithful in humane labors, and practically devoted to the improvement of society, Dr. Carpenter was greatly respected even by those who were his most staunch antagonists in theology.

Carpenter, Louis George, American engineer: b. Orion, Mich., 28 March 1861. He was graduated at Michigan Agricultural College in 1869, and after serving there as instructor in mathematics and engineering took post-graduate courses at the University of Michigan and Johns Hopkins University. In 1888 he became professor of engineering at the Colorado Agricultural College and meteorologist and irrigation engineer at the Agricultural Experiment Station, and organized the first course in irrigation engineering given in any American college. He founded the American Society of Irrigation Engineers in 1891. He has published Government Reports, 'Artesian Wells in Colorado' (1890); 'Irrigation Progress in Colorado' (1891).

Carpenter, Louis H., American military officer: b. Glassboro, N. J., 11 Feb. 1839. He entered the 6th United States Cavalry, and served in the Army of the Potomac through numerous engagements. He was an aide-de-camp to Gen. Sheridan; was commissioned colonel of volunteers in 1865, subsequently served in various Indian campaigns, became colonel of the 5th United States Cavalry in 1897, brigadier-general of volunteers in 1898, and brigadier-general, U. S. A., 18 Oct. 1899, for services in the Spanish-American war, and particularly as commander of the Department of Porto Principe, Cuba. He was retired 19 Oct. 1899.

Carpenter, Mary, English philanthropist: b. Exeter, 3 April 1807; d. Bristol, 15 June 1877. She was the eldest daughter of Lant Carpenter (q.v.). Her special work was for the neglected children of the poor and young criminals. She established a number of schools and reformatories, including the Red Lodge, a girls' school at Bristol, of which she was superintendent. She visited India in 1866, 1868, 1869, and 1875; and came to the United States and Canada in 1873, where she spoke on prison reform. She wrote 'Reformatory Schools for the Children of the Perishing and Dangerous Classes' (1851); 'Juvenile Delinquents' (1853); 'Our Convicts' (1864); and 'Six Months in India.' See J. E. Carpenter, 'Life of Mary Carpenter' (1879).

Carpenter, Matthew Hale, American legislator: b. Moretown, Vt., 22 Dec. 1824; d. Washington, D. C., 24 Feb. 1881. He studied at West Point, 1843–4; was admitted to the bar in 1845, and afterward studied under Rufus Choate. He removed in 1848 to Wisconsin, where he acquired a great reputation as a lawyer and orator. He was sent to the United States Senate from Wisconsin in 1869 and in 1879.

Carpenter, Rolla Clinton, American engineer: b. Orion, Mich., 26 June 1852. He was educated at the Michigan Agricultural College, the University of Michigan, and Cornell University; was professor in the Michigan Agricultural College, 1878–90, and later became professor of experimental engineering in Cornell. He has written 'Experimental Engineering'; 'Heating and Ventilation'; and numerous papers on engineering topics.

Carpenter, Stephen Cutter, American journalist: b. England; d. about 1820. He came to the United States in 1803, and settled in Charleston, S. C., where he founded and published with John Bristed the 'Monthly Register Magazine and Review of the United States.' Later he was editor of the 'Mirror of Taste and Dramatic Censor,' in which appeared some clever sketches of American actors. His works include: 'Memoirs of Jefferson, Containing a Concise History of the United States from the Acknowledgment of Their Independence, with a View of the Rise and Progress of French Influence and French Principles in that Country' (1809); 'Select American Speeches, Forensic and Parliamentary, with Prefatory Remarks, a Sequel to Dr. Chapman's Select Speeches' (1815); and under the pen-name of "Donald Campbell," 'Overland Journey to India' (2d ed, 1809–10), and 'Letter on the Present Times.'

Carpenter, William Benjamin, English physiologist and naturalist: b. Exeter, 29 Oct. 1813; d. 19 Nov. 1885. He was the eldest son of Lant Carpenter (q.v.); was educated in his father's school at Bristol, and in 1833 entered University College, London, as a medical student. Two years later he went to Edinburgh University, where he graduated as M.D. in 1839; and in that year also he produced his first important work, 'The Principles of General and Comparative Physiology.' In 1844 he was elected a Fellow of the Royal Society and also obtained the Fullerian professorship of physiology at the Royal Institution. From 1847 till 1852 he was editor of the 'British and Foreign Medico-Chirurgical Review,' and in 1856 he was appointed registrar of the University of London, a post which he resigned in 1879. He wrote several well-known works on physiology, one of which has been already referred to. Others are: 'Principles of Mental Physiology' (4th ed. 1876); and 'Principles of Human

Physiology' (1846, new edition by H. Power 1881). Still other works of his are: 'Introduction to the Study of the Foraminifera' (1862); 'The Microscope and Its Revelations' (1868, 6th ed. 1881); 'The Physiology of Temperance and Total Abstinence' (1853); besides many papers in scientific journals. He took a leading part in the expeditions sent out by government in 1868–70 for deep-sea exploration in the North Atlantic, and was chosen president of the British Association at Brighton in 1872.

Carpenter, William Henry, American philologist: b. Utica, N. Y., 15 July 1853. He received a university education in the United States and Europe, became instructor in rhetoric and lecturer on North European literature in Cornell University in 1883, instructor of German and Scandinavian languages in Columbia University, adjunct professor of Germanic languages and literature in the same institution in 1890, and subsequently professor of Germanic philology there. He has published several works in the line of his specialty.

Carpenter-bee, a species of bee (*Xylocopa virginica*) which burrows into dead tree-trunks, lumber, and even into woodwork of buildings. It is a large, black-bodied bee, as big as the biggest bumblebee. Its burrow is about half an inch in diameter, runs horizontally across the grain of the wood for a short distance, then forms a tunnel at right angles to this entrance, running sometimes 12 to 18 inches. When the tunnels are complete, the cells are made and supplied with pollen. The cells are about seven eighths of an inch long, and are separated from each other by partitions made of sawdust glued together. When the eggs, which are laid one in each cell, are hatched, the larvæ feed on the pollen-deposit until they are ready to bore their way out. The carpenter-bee will use the same burrow again and again, and its home is sometimes utilized by other species of bees.

Car'penters' Hall, Philadelphia, on the south side of Chestnut Street between Third and Fourth. It was built shortly after 1770 (as an assembly house and club) for the carpenters' guild of that city, and probably for civic uses if desired. In 1774 it became famous as the chosen meeting-place of several conventions for the liberation of the colonies. The first was on 15 July, when the committee of correspondence of the colony appointed a session of committees from each county, as "the most effective means toward a union." Later, on 5 September, the first Continental Congress met in its "plain but spacious rooms" on the lower floor, although the State house had been offered them. Behind its closed doors were prepared the papers which Chatham said ranked with the greatest of the world. The second Congress also began its sessions there, 10 May 1775.

Carpentras, kär-päṅ-trä, France, a town of the department of Vaucluse, situated 14 miles northeast of Avignon. In Roman times it was known as Carpentoracte, was a place of importance, and possessed many handsome edifices, of which a few traces are left. The principal structures are an aqueduct, which crossed the valley of the Auzon by 48 arches; a Roman triumphal arch, a Gothic cathedral, and the library. Carpentras has a considerable local trade, and weekly markets, which are among the most important in southern France. It was formerly the seat of a bishopric, and Pope Clement V. had his residence there in 1313.

Carpentry, the art of combining pieces of timber to support a weight or sustain pressure. The work of the carpenter is intended to give stability to a structure; that of the joiner is applied to finishing and decoration. The scientific principles of carpentry are founded on the doctrines of the composition and resolution of mechanical forces, and a knowledge of these doctrines, either theoretical or practical, is indispensable to the skilled carpenter. To go into the principles of the art would be merely to explain a particular application of these mechanical forces, which would be beyond the scope and limits of this work. An explanation of the terms employed in carpentry may, however, be useful to the general reader. The term "frame" is applied to any assemblage of pieces of timber firmly connected together. The points of meeting of the pieces of timber in a frame are called "joints." "Lengthening" a beam is uniting pieces of timber into one length by joining their extremities. When neatness is not required this is done by "fishing." In this mode the ends of the beams are abutted together, and a piece of timber placed on each side and secured by bolts passed through the whole. Sometimes the parts are indented together, and pieces termed "keys" are notched into the beams and side pieces. When it is desirable to maintain the same depth and width throughout the beam "scarfing" is employed. This is cutting from each beam a part of the thickness of the timber, of the length of the intended joint, and on opposite sides, so that the pieces may be jointed together, and bolted or hooped. In bolting scarfs, side plates of iron are used to protect the wood. When greater strength is required than can be produced by a single beam, "building" and "trussing" beams are resorted to. Building beams is combining two or more beams in depth so as to have the effect of one. In trussing the beam is cut in two in the direction of its length, and supported with cross-beams, as in roofing. "Mortise" and "tenon" is a mode of jointing timber. An excavation called a mortise is made in one piece, and a projecting tongue to fit it, called a tenon, in the other. The tenon is confined in the mortise by a pin penetrating it laterally through the side of the mortised beam, or by an external strap of iron passing round the mortised beam and rivetted in the one terminating in the tenon. The timber frame-work of floors is called "naked flooring." It is of three kinds — single, double, and framed. Single flooring consists of a series of joists stretching across the whole void from wall to wall, without an intermediate support. The flooring boards are laid on the top of these, and the ceiling of the lower story fixed to the under side. Double flooring consists in laying binding joists across the floor about six feet apart, crossed above by bridging joists, and also crossed below by the ceiling joists. Framed flooring is provided with girders or beams in addition to the binding, bridging, and ceiling joists. To prevent the transmission of sound, a double ceiling of lath and plaster is sometimes used, but generally pugging is inserted between the roof and the cealing. "Cornice bracketing" consists in rough wooden pro-

files of the room cornices, which are afterward lathed round and plastered. Partitions, when not required to bear weight, are formed by laying along the floor a piece of timber called a "sill," together with a corresponding piece along the ceiling joists, the space within being filled with vertical pieces called "quarters," to which the lath is nailed. When the partition has weight to support, it has to be trussed with posts and braces. The timbers which support the steps of a wooden staircase are termed the "carriage." They consist of two pieces of timber inclined to the "rake," or projection of the steps, and termed "rough strings," which may rest upon a piece of timber projected horizontally from the upper wall, called a "pitching" or "apron" piece, which also supports the joists of the landing or "half pace." The "roof" is the framework by which the covering of a building is supported. It may consist of a series of pieces of timber with their one ends resting on the opposite walls, and their other ends meeting in a point, which are called "rafters." When loaded with the weight of the covering, this framework would be apt to thrust out the roof; a third piece is consequently added, which, like a string, connects the lower extremities of the rafters and prevents them from spreading. This is called a "tie," and the whole frame a "couple." When the tie is of such a length that it is apt to droop in the middle, or "sag," by its own weight, a fourth piece is added to unite it directly with the apex of the rafters; this is called the "king-post." If the rafters, too, are liable to sag, cross pieces called "struts" are introduced, uniting their centres with the centre of the tie. Instead of the king-posts and struts, the centre of each rafter may be joined to the tie by a piece falling perpendicularly on the latter, and to each other by a piece running across parellel to and above the tie, forming a parallelogram with the perpendiculars and the section of the tie enclosed by them. The suspending pieces are called "queen-posts," and the horizontal one a "collar-beam." The whole frame, constructed in either way, is called a truss. The trussed frames are placed at intervals of about 18 feet apart, and support horizontal pieces called "purlins," which run the whole length of the roof and support the common rafters with their covering.

The principal instruments used in carpentry are saws, as the circular-, band-, and tenon-saws; planes, as the jack-plane, smoothing-plane, molding-plane, etc.; chisels, gouges, brad-awls, gimlets, descriptions of which will be found in their places.

Carpet (Lat. *carpere,* to "pluck" or "card," as wool), a thick woolen fabric used for covering floors. The word originally meant (in old French) a coarse cloth in which packages were wrapped for packing upon the backs of men and animals. As man advanced in civilization and desire for comfort, he began to use his packing *carpite* as a wrap for himself and to cover his feet and limbs at night. From that he began to use it to protect his sandaled feet from cold stone floors. Then the material was made finer and gradually embellished with colors and designs. The art progressed most rapidly in the cold mountain districts of western Asia — Persia, Turkey, Syria.

The art of carpet-making in its best sense still remains with the Orient. Some of the Indian carpets approach the fineness of those of Persia. Very high prices have often been obtained for some of these Oriental weaves.

Carpet Industry in America. A hundred years ago very few woolen carpets were in use in America. A few wealthy people had Turkish rugs, and some ingrains were imported; but they were so rare that children were cautioned to tread lightly on them when permitted on state occasions to enter the carpeted room. No carpets were made in America except "rag carpets" — the striped combination of rags and list which the housewives wove at home, and which are still made in small quantities both in farm-houses and in factories. The first carpet dealers in New York of whom we know anything were J. Alexander & Company, whose advertisement in Parker's *New York Gazette;* or *The Weekly Post-Boy,* on Monday, 30 June 1760, read as follows:

"J. Alexander & Company have removed their store to Mr. Haynes's house on Smith St., where Mr. Proctor, watch-maker, lately lived, where they sell Check Handkerchiefs, linens of different kinds, Lawn and Minonets, Scot's Carpets, broad and narrow cloths, Shoes of different kinds, made shirts, Hats, Stockings, with several other goods; Eine's Scot's barley and Herrings. Also a choice parcel of Old Madeira in Pipes."

In the following year they offered for sale Turkey carpets, and two years later state that they "have imported some English and Scot's carpets and Hair Cloth for Stairs and Passages." They were then located "in the house right opposite Mr. Donald Morison Ship Chandler House, betwix the Fly and Burling Slip." Judging from their advertisements in the papers of the day, they were not only the pioneers in the carpet business, but also the originators of the modern department store. From this time on the use of carpets began to increase and the business to grow, until, according to the city directories, there were lately over 300 firms engaged in the sale of carpets in New York and Brooklyn, the amount of capital invested being many millions. It was not until many years after carpets were first used in the colonies that the manufacture was introduced here, and the colonies had then become the United States. In 1791 William Sprague began to make Axminsters in Philadelphia. One of his first productions was a pattern which represented the coat-of-arms of the young republic. The carpet was probably not wonderful, but it has achieved fame, not so much on account of the fact that it was our first attempt, as because it was the first article to which the principle of tariff protection was applied. Alexander Hamilton was secretary of the treasury, and in a report on manufactures sent to the House of Representatives in 1791, he recommended that a duty of two and a half per cent be laid on carpets. To quote his own words: "To which the nature of the articles suggests no objection, and which may at the same time furnish a motive the more to the fabrication of them at home, toward which some beginnings have been made." (5 Dec. 1791.) The proceeds of this duty he proposed to use as a bounty to encourage the growth of wool in the United States.

Early in the century the manufacture of ingrain carpets was begun, and has continued steadily increasing in amount ever since. Probably the first ingrain mill in the United States was that of George M. Conradt, who came to this country from the kingdom of Würtemberg, and settled in Frederick County, Maryland. The factory was a stone building, and was still standing not many years ago. The carpets were made in a hand-loom on a drum having rows of pegs somewhat like the cylinder of a music-box. This drum worked the harness. Jacquard's great invention was made in 1800, and soon after began to be applied to the weaving of carpets in this country. Among the early mills was one owned by Henry Burdett, at Medway, Mass. Alexander Wright was the superintendent, and the concern is notable as having been the starting-point of what became later the great corporation known as the Lowell Manufacturing Company, whose carpets afterward were the standard goods of the country. In 1825 Wright endeavored to gain information touching the jealously guarded secrets of the Jacquard machine, then in use in the manufacture of ingrains in Philadelphia, which city seems to have been the second starting-point for the manufacture of ingrains. He was unable to gain access to the mills, and sailed for Scotland, whence he soon returned with the best looms he could procure. He also brought over with him William and Glaude Wilson, to aid in operating the machinery. Glaude Wilson was a skilled mechanic, and devised improvements in the Jacquard loom, simplifying its construction and rendering it more certain in operation. He resided many years in Lowell, and lived to see the Lowell Company become one of the most important manufacturing establishments in the country.

While the Medway experiment was going on, a charter had been granted to the Lowell Manufacturing Company, and on 22 Feb. 1828 its organization was completed. In those days directors' meetings were held at seven o'clock in the evening. Whitney, Cabot & Company were appointed to build the mills, employ the labor, and afterward sell the goods. The Medway mill and machinery were sold to the Lowell Company, which kept the looms in operation in that place until its own factory at Lowell was finished. Alexander Wright, referred to above, was the first superintendent. For a long time the enterprise was regarded as an experiment and many believed that the demand for carpets would not justify paying for the skill necessary to make them. The hand-looms of those days were by no means as perfect as the hand-looms of our time. The Lowell Company, however, persevered, and ingrain factories continued to spring up in various parts of the country. The progress was slow, and with the exception of the Hartford Carpet Company, then operating as two separate concerns, very few of the firms which afterward became famous started until many years later.

E. S. Higgins & Company began to manufacture ingrains in New York in 1841. Alexander Smith began at West Farms in 1844. Robert Beattie started in New York in 1840. John Bromley did not set up his looms in Philadelphia until 1845. Philadelphia has now some of the finest factories in existence, and its production is larger than that of all the rest of the country combined. More yards of ingrain carpets are made there than in any other city in the world, and the goods range from the highest to the lowest grade. The imports from England and Scotland continued to be heavy in spite of distance and duties, as up to 1850 hand-looms only being in use, the product of these and the other mills using these looms was necessarily very limited, and we had to overcome the prejudice against domestic goods.

Meanwhile Alexander Smith and J. G. McNair had devoted much time and labor to the invention of a patent process for weaving tapestry ingrains. They succeeded in producing a carpet which filled a want of the times for a strong and durable fabric in which a large variety of color could be introduced. The Crossleys, of Halifax, England, purchased the rights to the invention, paying a royalty of a penny a yard for England. Templeton, of Ayr, paid £200 and a like royalty for Scotland. The goods become enormously popular, and Stephen Sanford, of Amsterdam, N. Y., also secured the right to manufacture them. The fame of the carpets spread so rapidly that it did much to stop the importation of foreign ingrains.

Erastus B. Bigelow (q.v.), a young medical student of Boston, who was but 20 years of age, had seen somewhere the manufacture of coach-lace by hand. He was without mechanical training; and, in fact, had never read a book on the subject; but in 40 days after he took up the idea he perfected a power-loom by which coach-lace weaving could be done. At a single stroke he so reduced the cost of weaving this class of goods that what had previously cost 22 cents a yard was reduced to three cents. This invention brought him into notice, and he set to work to devise a power-loom for ingrain-carpet weaving. Before the year was out he succeeded. At this time eight yards a day was the product of the ingrain hand-loom. Mr. Bigelow's loom at once increased the product to 10 and 12 yards, and, after some defects had been remedied, rolled it up to 25 yards a day, thus stimulating successive inventors of power-looms, such as Duckworth, Murkland, Crompton, and others, who have multiplied the result, so that the product now reaches to from 40 to 45 yards a day, although the hours of labor have been materially shortened.

But Mr. Bigelow did not rest here. In 1848 he set to work to invent a power-loom for the weaving of Brussels and tapestry carpets. At this time the product of a long and hard day's labor for a weaver, including a boy to draw the wires, was seven yards of Brussels carpet. At once Mr. Bigelow raised this to over 25, some modern machines now getting 55 yards of production in a day. Prior to the perfecting of this invention, he had, with his brother, Horatio N., organized the Bigelow Carpet Company, which has the honor of being the original power-loom manufacturer of Brussels and Wilton carpets. The company has been very successful, and now ranks among the foremost concerns in the world. The Crossleys of England, promptly purchased, at a cost of £20,000, the right to use the Bigelow loom in England; and A. & E. S. Higgins, of New York, and the Roxbury Carpet Company, of Massachusetts, also secured the exclusive use for the United States for tapestry and velvet during the term

of the patent. Mr. Bigelow, of course, reserved the right to manufacture Wiltons and Brussels on his own loom. It has been my experience, in a connection of over 30 years with the trade, that the Wiltons, velvets, Brussels, and tapestries made at that day by these establishments would compare favorably in durability of wear and stability of color with the same grades of any country in the world.

The success of Mr. Bigelow's looms stimulated others to like inventions. The manufacture of Axminster and moquette carpets by hand in foreign countries was one of the slowest of trade processes. In this two men and a boy were employed at one loom, and could make but one and a half yards of French moquette in a day. In 1860 Alexander Smith and Halcyon Skinner, of Yonkers, invented an Axminster and moquette power-loom which was perhaps more striking in its ability to increase the productive capacity of labor than was that of Mr. Bigelow.

This was the beginning of a second era in the trade. The invention increased the production to about 11 yards per day, the loom being attended by a girl. Its merits were universally conceded, and foreign and domestic manufacturers were glad to pay large royalties for its use. The Alexander Smith & Sons Carpet Company became one of the most famous in the world, and its plant in Yonkers is to-day the largest of the kind in the country. How thoroughly American invention and American mechanical skill have gained control of the home market can easily be understood from a few figures which I present:

In the year ending 30 June 1870 there were entered at the port of New York alone body Brussels and tapestry Brussels valued at $1,355,832; in 1900 there were imported in the entire United States body Brussels and tapestry Brussels valued at less than $60,000. In 1870 the manufacture of carpets in the United States amounted in value to $21,761,573; in 1900 the value of the carpets made in the United States was over $50,000,000.

The number of firms engaged in the various departments, with the approximate number of power-looms employed (1902) was as follows:

PRODUCTION OF CARPETS.

Varieties	Manufacturers	Power-looms
Ingrains	89	4,800
Brussels and Wilton	16	1,200
Tapestry and Velvet	14	1,700
Axminster	6	600

These firms were capable of producing 100,000,000 yards, of the value of $50,000,000. There are also many hand-looms on ingrains, and many manufacturers of damasks and Venetians, Smyrna and other rugs and mats.

On the artistic side the improvement has been equally great. At the outset most of our designs were copied or adapted from foreign patterns. It was only a few years ago that a foreign manufacturer, to whom I showed a sample of the first piece of tapestry produced by Stephen Sanford, remarked, after examining the fabric closely, "Well, you may be able to manufacture the goods, but you can't design them." In less than five years from that time, the same gentleman, on his way to Canada to sell goods, proposed to me to exchange samples, that he might take orders from the American patterns. After looking through his line, I thanked him, with the assurance that I could find nothing there that could compare favorably with the discarded designs of last season's patterns of our domestic manufacture. In the fully equipped studios of the Bigelow, Lowell, Smith, Hartford, Higgins, and the Philadelphia companies a large proportion of the designers are Americans, and the proportion is steadily increasing. The American dealer of to-day has to overcome very little prejudice against either the fabric, color, or pattern of American carpets, and it is long since I have heard a customer ask, "Is it English?"

Were I able to give the exact amount of money expended each year, from the time the wool leaves the sheep's back until the carpet reaches its resting-place upon the floor of our homes, to be trodden upon, beaten, and sometimes abused, notwithstanding the fact that there is no article which goes so far to make the home comfortable and attractive, the figures would be astonishing. The people employed in designing, manufacturing, and selling this article to-day would form a sufficient population for a young republic, with abundant capital to carry on the government.

The skill and inventive genius in carpet manufactories have so built up the home industry of the United States as to give employment to a vast army of operatives, and reduced the cost of the manufactured article to such an extent that the humblest citizen is enabled to have a floor well carpeted with fabrics that are attractive, and even artistic; and, with the thrifty housewife, the addition of a rug or two upon the carpet and a good lining underneath is necessary, in her estimation, to sustain her status as one of the social leaders in her humble sphere.

In no other time and no other country has such comparative luxury been within the reach of modest means. The white and well-scrubbed floor of the Holland frau, the polished oak and tiling of France, Germany, Italy, Austria, and the other countries of continental Europe, have given no precedent for the American indulgence in carpets; and even England, outgrowing the rush- and straw-strewn floors of the time of Erasmus, has not yet learned to fill the great gap between the velvet pile carpets of the homes of the nobility and the bare boards of the White-chapel tenements. It is in this respect that the United States stands forth pre-eminent. There are carpets for all, and from the days when the grandmothers wove their rag carpets, to the present, when a far superior article is turned out from nearly every factory in the country, at a cost cheaper even than that of the home-made article, there have been few American homes too poor to enjoy the comfort of neat and pretty floor coverings.

SHEPPARD KNAPP,
Of Sheppard Knapp & Co., New York.

Carpet-baggers, Carpet-bag Governments. The admission of the southern negroes to the franchise after the war involved their organization and leadership, and their representation in State and national offices by intelligent whites. As no southern whites of character would undertake what they regarded as a crusade against civilization, the task fell to northern Republicans. Those who undertook it were of all grades of personal integrity and honesty of purpose, from sincere old-fashioned abolitionists

to mere scalawag adventurers; but they had one characteristic in common: the lack of property interests in the South to make its injury theirs. Hence the name, implying that their only possessions there were in their carpet-bags. The name was at first given only to those whose one motive for residence there was election to office from thence; and the purpose of many was voiced in the utterance of one high official, that when he could no longer hold office from there he would no longer live there. But the régime of monstrous plunder and social and industrial ruin which the system brought on, the levying of fraudulent taxes, and the piling up of huge State debts for the future, soon effaced all distinctions. All Northerners who upheld the system or tried to protect the negroes' voting rights were confounded under the name; all State governments in any way protected from overthrow by United States troops were "carpet-bag" governments; and finally the entire years of Reconstruction, and that attempt itself, are compendiously known as the "Carpet-Bag Régime."

Carpet-beetle, a small beetle (*Anthrenus scrophulariæ*), often wrongly called "buffalo-bug." In the grub or larval state, it is injurious to carpets and similar fabrics. It is an active, brown, hairy larva, the size of a grain of wheat, which works in a hidden manner from the under surface, sometimes making irregular holes, but more frequently following the floor-cracks and cutting long slits in a carpet. This insect was brought from Europe about 1874, and is abundant in the New England States and westward to Kansas. The adult insect is a minute, broad-oval beetle, about three sixteenths of an inch long, with a red stripe down the middle of the back. When disturbed it folds up its limbs and feigns death. As a general thing the beetles begin to appear in the autumn, and continue to issue, in heated houses, throughout the winter and following spring. Soon after issuing they pair, and the females lay their eggs in convenient spots. The eggs hatch in a few days, and the larvæ develop rapidly. Their development is retarded by cold weather or by lack of food, and they may remain alive for an indefinite period. When, under normal conditions, the larva reaches full growth, the yellowish pupa is formed within the last larval skin, from which the beetle emerges later. The beetles are day-fliers, and when not engaged in egg-laying are attracted to the light. They fly to the windows, and may often be found upon the sills or panes. The carpet beetle is very difficult to exterminate, and the best preventative is the use of movable rugs on hard-wood floors. Suspected carpets should be taken up, beaten, sprayed out of doors with benzine, and then be well aired. Before relaying the carpet, tarred roofing-paper should be laid upon the floor.

Another similar pest is the black carpet-beetle (*Attagenus piceus*), whose larva is readily distinguished from the buffalo-bug by its cylindrical shape and lighter color. It is not so fond of working in cracks and cutting long slits in carpets, and in general is not so dangerous a species as the other. It sometimes produces in feather-beds a peculiar felting of the ticking. It has also been known to infest flour-mills, and is to a certain extent a feeder upon cereal products. Two years are required for its development from egg to beetle. Consult Howard and Marlatt, 'Household Insects' (U. S. Department of Agriculture, Washington, 1896).

Carpet-snake, a python (*Python spilotes*) of Australia and New Guinea, which takes its name from the rich variegation of its colors, which are mainly black with yellow spottings. It spends most of its time in trees, and reaches a length of six feet. See PYTHON.

Carpi, Girolama da, jē-rō'lä-mō dä kär'-pē, Italian painter: b. Ferrara; d. 1556. He painted many pictures for the churches of his native place, and at Bologna, and was a great admirer of Correggio and Parmegiano, whose works he copied with great success.

Carpi, Ugo da, oo'gō dä, Italian wood-carver: b. Carpi, 1455; d. 1523. He is generally considered as the inventor of that species of carving denominated *chiaroscuro.* He was preceded in the art by Albert Dürer and Lucas Cranach (q.v.).

Carpi, kär'pē, Italy, a town in the province of Modena and nine miles north of the city of Modena. It is the seat of a bishopric, suffragan to Bologna. It is surrounded by walls, defended by a citadel, and has a cathedral, a seminary, and manufactures of straw hats and spun silk. The neighborhood produces rice, wheat, hemp, and flax. Pop. about 6,000.

Carpio, Bernardo del. See BERNARDO DEL CARPIO.

Carpio, Manuel, mä'noo ĕl kär'pē-ō, Mexican poet and politician: b. Casamaloapan, 1 March 1791; d. 11 Feb. 1860. He studied medicine and became professor of physiology in the University of Mexico, and entering political life he became a leader of the Conservatives. In 1825 and 1848 he was deputy, in 1851 senator, and in 1853 councilor of state. Several editions of his 'Poesias' have been published, the latest in 1883.

Carpoc'rates, a native of Alexandria, who in the 2d century revived several Gnostic errors. He rejected the Old Testament and the gospels of St. Matthew and St. Luke; denied the resurrection of the dead, and advocated the most licentious mode of life. Mosheim calls him "the worst of all the Gnostics."

Car'polites, a term applied to fossils of the nature of fruits, usually found in the Carboniferous system. Their exact place in the vegetable kingdom has not yet been determined.

Car'pophore, a stalk bearing the pistil, and raising it above the whorl of the stamens, as in *Passiflora.* Also applied to the stalk between the achenes of *Umbelliferæ.*

Carpus, in anatomy, the bones between the forearm and hand, the wrist in man, or corresponding part in other animals. See HAND.

Carpzov, kärp'tsŏf, the name of a German family which has furnished several eminent jurists and theologians. The founder of the family was Simon Carpzov, burgomaster of Brandenburg, in the middle of the 16th century. He had two sons: Joachim, who at his death at Glückstadt in Holstein, in 1628, was commander-in-chief of the Danish army; and Benedict, b. 1565; d. 1624. He was appointed professor of law at Wittenberg in 1595, became chancellor of

the Dowager-electress Sophia at Kolditz, but afterward returned to Wittenberg. A second Benedict, son of the former, b. Wittenberg 1595; d. 1666; became assessor of the supreme court and professor of law at Leipsic in 1645, then councilor of the court of appeal and member of the privy-council at Dresden. He was one of the most eminent jurists of his day, and is the author of several valuable legal works; but is justly censured for the severity and cruelty of his proceedings. He is said to have signed the death-warrants of not fewer than 20,000 persons. JOHANN BENEDICT CARPZOV, his brother (b. Rochlitz, 1607; d. 1657); became professor of theology at Leipsic, and is famed as the author of the 'Systema Theologicum' (1653). He left five sons, one of whom, JOHANN BENEDICT (b. 1639; d. 1669), became professor of theology and pastor of St. Thomas' church at Leipsic, distinguished himself by his knowledge of Hebrew language and literature, and translated several rabbinical works. Another member of the family, JOHANN GOTTLIEB CARPZOV, born at Dresden in 1679, became professor of Oriental languages at Leipsic, and died as superintendent at Lübeck in 1767. He was one of the most eminent theologians of his time, and wrote, among other treatises, 'Critica Sacra Veteris Testamenti' (1728); 'Introductio in Libros Canonicos Veteris Testamenti.'

Carquinez, kär-kē'nĕs, or **Karquenas,** a strait between Contra Costa and Salano counties, California; its greatest width is two miles and its length seven miles; it is navigable, and connects the bays of San Pablo and Suisin.

Carr, Dabney, American colonial politician; d. May 1773. He was a member of the house of burgesses of Virginia, and moved and eloquently supported a resolution to appoint a committee of grievances and correspondence, in consequence of British encroachments. His resolution was adopted, 3 March 1773. He married a sister of Jefferson, by whom he is described as a man of sound judgment and inflexible purpose, mingled with amiability, and of a fanciful eloquence.

Carr, Eugene Asa, American army officer: b. Concord, N. Y., 20 March 1830. He was graduated at the United States Military Academy in 1850, and joined the Mounted Rifles. He accompanied the Sioux Expedition in 1855, and was active in suppressing the insurrections on the Kansas border in 1856. In 1860 he was engaged in a campaign against the Comanche Indians. He was in active service throughout the Civil War, commanding the 4th Division of the Army of the Southwest, and subsequently acting as commander of the same army. He commanded a division in the Vicksburg campaign in 1863, and led the assault on the works of that city, 18 May. In December 1863 he was assigned to the Army of Arkansas. At the close of the war he was promoted to brigadier-general, U. S. A., and brevetted major-general of volunteers. In 1868–9 he was engaged against the Sioux and Cheyenne Indians, and afterward took part in other expeditions against hostile Indians. He fought in 13 engagements with Indians, was four times wounded in action, and received a congressional medal of honor and the thanks of the legislatures of Nebraska, Colorado, and New Mexico. He was retired in 1893.

Carr, Frank Osmond, English composer: b. near Bradford, England, 23 April 1858. He was educated at Cambridge University from which he received the degree of doctor of music in 1891. He has furnished the music to the opera librettos of 'Faddimir,' 'Joan of Arc,' and 'Out of Town,' by Arthur Reed Ropes (q.v.), and also that for W. H. Gilbert's opera, 'His Excellency.'

Carr, Henry Lascelles, English journalist: b. Knottingly, Yorkshire, 1841; d. 5 Oct. 1902. He was educated for the Anglican priesthood at St. Aidan's Theological College, Birkenhead, but after qualifying for orders decided upon a literary career. After being for some time on the staff of the Liverpool *Daily Post,* he removed to Cardiff, where he was successively sub-editor, manager, editor and part proprietor of the *Western Mail.* He retired in 1901. He published 'Yankee Land and the Yankees'; 'Letters from the United States of America.'

Carr, Joseph Bradford, American military officer: b. Albany, N. Y., 16 Aug. 1828; d. Troy, N. Y., 24 Feb. 1895. He joined the militia in 1849, and rose to the rank of colonel. In 1861 he was appointed colonel of the 28th New York Volunteers, and led them at the battle of Big Bethel and in McClellan's Peninsular campaign. He took part in the battles of Chancellorsville and Gettysburg, and for his bravery throughout the war he was brevetted a major-general of volunteers. After the war he became prominent in Republican politics in New York State, and was elected secretary of state in 1879, 1881, and 1883. In 1885 he was an unsuccessful candidate for lieutenant-governor.

Carr, Joseph William Comyns, English art critic and dramatist: b. 1849. He was educated at London University and was admitted a barrister of the Inner Temple in 1869. He has been English editor of 'L'Art' and art critic of the 'Pall Mall Gazette.' He has published 'Drawings by the Old Masters' (1877); 'The Abbey Church of Saint Albans' (1878); 'Examples of Contemporary Art' (1878); 'Essays on Art'; 'Papers on Art'; 'A Fireside Hamlet'; 'The United Pair'; 'The Naturalist'; 'The Friar'; 'Forgiveness'; 'King Arthur.'

Carr, Lucien, American archæologist: b. Lincoln County, Missouri, 1829. He received a collegiate education and from 1876 to 1894 was assistant curator in the Peabody Museum. He has written 'Mounds of the Mississippi Valley' (1883); 'Missouri, a Bone of Contention' (1888); 'Prehistoric Remains of Kentucky' (with N. S. Shaler).

Carr, or Ker, Robert, VISCOUNT ROCHESTER, EARL OF SOMERSET, a British politician: b. Scotland; d. July 1645. He followed James I. to England when that monarch became Elizabeth's successor. James chose him as his chief favorite and adviser, knighted him, gave him a seat in the House of Lords, and assisted him in his schemes for a marriage with Lady Essex. The latter after procuring a divorce was married to the earl, and in 1615 the couple were tried for the murder of Sir Thomas Overbury. They were condemned to death but pardoned.

Carr, SIR Robert, British commissioner in New England: b. Northumberland; d. Bristol, England, 1 June 1667. He was appointed to that office by Charles II. in 1664, in conjunction

with Nicolls, Cartwright, and Maverick. In 1664, Nicolls and Carr captured New Amsterdam from the Dutch, calling it New York, in honor of the king's brother, the Duke of York, afterward James II. Carr forced the Swedes and Dutch on the Delaware into a capitulation. He returned to Boston in 1665, and, in conjunction with his coadjutors, assumed the principal powers of government.

Carracci, or **Caracci, Agostino,** ä-gōs-tē'-nō kär-rä'chē, Italian artist: b. Bologna 1558; d. Parma 1602. One of a family of artists who founded the Bolognese or Eclectic school of painting. He was a brother of Annibale Carracci, and distantly related to Lodovico Carracci, under whose guidance he studied art. He attained great mastery in engraving, and engraved more pieces than he painted, in order, it is said, to please his brother Annibale, who became envious of his fame after one of Agostino's pictures had obtained a prize in preference to one of his own, and another excellent picture — 'The Last Communion of St. Jerome' — had gained his brother universal admiration. In 1600 Agostino accompanied Annibale to Rome, and assisted him in painting the Farnesian Gallery. As many persons said that the engraver worked better than the painter, Annibale removed his brother, under the pretext that his style, though elegant, was not grand enough. Agostino went then to the court of the Duke of Parma, and painted there a picture representing the heavenly, the earthly, and the venal love. There was only one figure wanting when, exhausted by labor and mortification, he died. He wrote a treatise on perspective and architecture. As an engraver he deserves great praise, and often corrected the imperfect outlines of his originals.

Carracci, Annibale, än-nē-bä'lē, Italian painter: b. Bologna, 1560; d. Rome, 1609. He worked first with his father, who was a tailor. By the advice of Lodovico Carracci he learned drawing, and made the most astonishing progress, copying first the pieces of Correggio, Titian, and Paul Veronese, and painting, like them, small pictures, before he undertook large ones. In the academy founded by the Carracci he taught the rules of arrangement and distribution of figures. He is one of the greatest imitators of Correggio. His 'St. Roque Distributing Alms,' now in Dresden, was the first painting which gave him reputation. His 'Genius of Glory' is likewise celebrated. In the Farnesian Gallery at Rome, which he, aided by his brother Agostino, painted (1600–4), there breathes an antique elegance and all the grace of Raphael. You find there imitations of Tibaldi (who painted at Bologna about 1550 with Nicolo del Abate), of Michael Angelo (the style, indeed, somewhat softened), and the excellencies of the Venetian and Lombard schools. Outside of Bologna he is acknowledged as the greatest of the Carracci. In that city, however, Lodovico is more admired. Agostino, perhaps, had more invention, and Lodovico more talent for teaching; but Annibale had a loftier spirit, and his style is more eloquent and noble. He was buried at the side of Raphael in the Pantheon. His best picture is that of 'The Three Maries,' now at Castle Howard, in Yorkshire, England.

Carracci, Lodovico, lō-dō-vē'kō, Italian painter: b. Bologna, 1555; d. 1619. He was the eldest of the three Carracci, and is regarded as the chief founder of their school. He was the son of a butcher, and appeared at first to be more fit for grinding colors than for transferring them to canvas. But his slowness did not arise from deficiency of talent, but from zeal for excellence. He detested all that was called ideal, and studied only nature, which he imitated with great care. At Florence he studied under Andrea del Sarto, and enjoyed the instruction of Passignano. He went to Parma for the purpose of studying Correggio, who was then imitated by almost all the Florentine painters. At Bologna he endeavored to gain popularity for his new principles among the young artists, and united himself with his relatives, Agostino and Annibale Carracci, whom he sent in 1580 to Parma and Venice. In 1589 they established an academy for painters at Bologna, called the Academia degli Incamminati (from *incamminare,* to put in the way), which they directed jointly till 1600, the year of the departure of Agostino and Annibale for Rome. From that time till his death Lodovico was sole director. The academy was so successful that similar institutions in Bologna had to be closed. Among his most famous pupils were Domenichino and Guido Reni. His first principle was, that the study of nature must be united with the imitation of the best masters. He soon gave an example of this principle in his 'Prophecy of John the Baptist,' in the monastery of the Carthusians, imitating in single figures the style of Raphael, Titian, and Tintoretto. The finest works of Lodovico are in Bologna, especially in the picture gallery or *Pinacoteca,* and among them are 'The Annunciation'; 'The Transfiguration'; and 'St. George and the Dragon.' He excelled in architectural views and in drawing, and in general was very thorough in all the branches of his art. He also executed several fine engravings.

Carrageen, kär'ra gēn, **Carragheen,** or **Irish Moss,** a name applied to several species of marine algæ found abundantly near Waterford, Ireland, at a place called Carragheen, from which the name is derived. It abounds also on the rocks in other localities in Great Britain and Ireland, and is found on the east coast of North America. The species from which the carrageen of commerce is chiefly derived is a seaweed called *Chondrus crispus.* The frond is thick, cartilaginous, somewhat fan-shaped, and repeatedly forked; color, various shades of purple or green. It is gathered from the rocks, washed, bleached in the sun, and dried, and is then the Irish moss of commerce. In hot water it swells up, and on boiling it dissolves. The results of the analysis of Irish moss are somewhat discordant; but the main constituent is a mucilage, which differs from gums, starches, and jellies by not giving their characteristic reactions. It is nutritious, and is substituted for animal jelly and starches in the preparation of soup, jellies, creams, and similar dishes. It is of value in pulmonary troubles, and is also used by painters and others in the preparation of size. It is sometimes confounded with Iceland moss, which is a lichen. See ICELAND MOSS.

Carrara, kär-rä'rä, Italy, a city in the province of Massa-e-Carrara, Tuscany, on the Lavensa, near the Mediterranean, and 60 miles

west-northwest of Florence. An academy of sculpture is established here, and several artists have their residence, attracted by the convenience of obtaining marble almost cost-free. Carrara has some fine churches, an academy of the fine arts, a statue of Garibaldi, and is surrounded by marble hills, which have made it celebrated. Most of the inhabitants are employed in, or in connection with, the quarries. Pop. 42,000. See CARRARA MARBLE.

Carrara (kär-rä'rä) **Marble** (so called from the city of Carrara), the variety of marble generally employed by statuaries. It is a white crystalline limestone, sometimes with black or purplish veins, and occurs in deposits of enormous extent — veritable «marble mountains.» Carrara marble, which was formerly supposed to be a primitive limestone, is now considered an altered sub-carboniferous limestone. The plutonic action to which it has been subjected, has served to obliterate the traces of fossils. The mountains containing the marble are situated a few miles from the sea, and reach the height of over 5,000 feet. Although the quarries have been worked for 2,000 years, having furnished the material for the Pantheon at Rome, the supply is still practically inexhaustible. Those quarries supplying the pure white marble used for statuary are the most valuable. The so-called «Carrara district,» embracing the communes of Carrara, Massa, Pietrasanta, Seravezra, Stazrema, and Arni, is the centre of the marble industry. Carrara and Massa are the two most important, the former having a population in the city itself of 21,000 people, with an additional 21,000 in the mountain villages surrounding it and forming part of the commune. These villages are inhabited almost entirely by the quarrymen and laboring class. The commune of Massa has a population of about 24,000. Broadly speaking, the entire male population of these two communities is actively engaged in some branch of the marble industry. There were in 1901 in the district 611 quarries in active operation, of which 345 are at Carrara, 50 at Massa, and the rest distributed among the places named above. In addition to these, there are perhaps double this number which have been opened and afterward abandoned as being unproductive, or in which, for various reasons, active work has for the time being ceased. Under the sanction of ancient laws, the mountains where the quarries are found are the property and under the direct control of the municipality of the district in which they are located. Applications for leases are made to the syndic of the town, and within a reasonable time, after survey, etc., the concession is granted. The concession is permanent, the only conditions being that the grantee should formally renew it every 30 years, pay the annual rent, and work the property. The rent is merely nominal. Failure to pay it for two successive years or to develop the property in the same length of time renders the concession void. Quarries thus leased may be sold or transferred, or left as an inheritance by the grantee at any time, without formal permission from the grantor. Until 1890 most of the output of the quarries was transported to the local mills, and to the Marina for shipping, by ox-teams. But now the quarry railroad, completed in 1890, greatly facilitates this transportation. From Carrara it makes the difficult ascent of the mountains, through many tunnels and over high viaducts, to a point some 1,500 feet above the sea-level. Tremendous obstacles were overcome in the construction of these 15 miles of railroad, the completion of which cost about $4,000,000. Although largely patronized by the quarry owners, it has not as yet entirely supplanted the former method of hauling by ox-team.

Carraray, Philippines, a small island about 30 miles long and 6 miles wide. It has coal deposits. The population is sparse and wholly uncivilized, subsisting by trade with the neighboring islands of Samar and Luzon.

Carré, Michel, mē-shĕl kä-rā, French dramatist: b. Paris, 1819; d. Argenteuil, near Paris, 27 June 1872. He first published a volume of poems, 'Folles rimes'; then turned to the drama and wrote 'La Jeunesse de Luther' (1843) and 'Scaramouche et Pascariel.' He then worked in collaboration with other authors, especially with Jules Barbier. With him he wrote many dramas, vaudevilles, and opera librettos, several of which met with much success; among his other works are 'Van Dyck a Londres' (with Narrey, 1848); 'Jobin et Nanette' (with Battu, 1849); and 'Le Tourbillon' (with Deslandes, 1866).

Carrel, Nicolas Armand, nĭk-ō-lä är-mäṅ kä-rĕl, French writer and republican leader: b. Rouen, 8 May 1800; d. 24 July 1836. He was educated at the military school of St. Cyr. He entered enthusiastically into several of the secret political societies which were numerous in France after the restoration of the Bourbons. In 1819, when lieutenant of the garrisons of Belfort and Neubreisach, he became implicated in a conspiracy, and though his conduct escaped investigation he was removed with his regiment to Marseilles. He resigned his commission to take an active part in the politics of his time. Finally settled in Paris, he zealously prosecuted his historical and political studies, and became intimate with Thiers, Mignet, and Augustin Thierry, particularly the last. He published a 'History of the Counter Revolution in England,' and in 1830 united with Thiers and Mignet in editing the *National,* which soon rose to be the leading opposition newspaper. After the revolution his colleagues joined the government, and he was left with the chief direction of the paper, which still continued in opposition. In 1832 the *National* became openly republican. Carrel was mortally wounded in a duel with Émile de Girardin. He has been called the Bayard of republican journalism.

Carreño, Teresa, tā-rā'sä kä-rā'ñō, Venezuelan pianist: b. Caracas, 22 Dec. 1853. She was educated by her father and by Julius Hoheni; in 1862 she appeared as a concert player in New York and attracted the interest of Gottschalk, who gave her some instruction especially in regard to playing his own compositions. She has traveled widely in America, and given many concerts; she not only has a high rank as a pianist, but also has won success as a concert singer, and has published a number of musical compositions. Her first husband was Sauret, the violinist, from whom she was divorced; she has also married and divorced Tagliapietra, the singer, and Eugene d'Albert, the pianist.

Carreño de Miranda, Juan, hoo-ān kär-rā'ñō dā mē-rān'dā, Spanish painter: b. Avilés, Asturias, 25 March 1614; d. Madrid, 1685. He was a pupil of Bartolomé Roman and Pedro de Las Cuevas in Madrid, and became court painter. He painted many portraits and excelled in religious subjects. As a colorist the Spaniards rank him with Titian and Vandyke. His principal paintings are a 'Magdalen in the Desert,' at Madrid; a 'Holy Family,' at Toledo; and a 'Baptism of our Saviour,' at Alcala de Henares.

Carrer, Luigi, loo-ē'jē kär'rĕr, Italian poet: b. Venice, 1801; d. 23 Dec. 1850. He was professor of philosophy at Padua, from 1830 to 1833, when he went to Venice, where he conducted a literary journal for nine years, during which time he was also appointed by the municipal council professor in the school of arts and sciences, and director of the museum. Here he published several works, the most popular of which is 'L'Anello di Sette Gemme,' a poetic description of the history and customs of Venice.

Carrera, kär-rā'rā, the name of three brothers distinguished as Chilean revolutionists — José Miguel, Juan José, and Luis. The chief of them, José Miguel, was born at Santiago, 15 Oct. 1785; d. 5 Sept. 1821. They were the sons of a rich landholder in Santiago, Don Ignacio Carrera. One of them served in Europe until 1811, and attained the rank of lieutenant-colonel and commandant of a Spanish regiment of hussars. The three brothers took an active part in the revolution from its commencement, and in November 1811 obtained the effective control of the revolutionary government. José Miguel Carrera was elected first president of Chile. In 1813 he was deposed and succeeded by O'Higgins. The brothers Juan José and Luis, were apprehended in 1817 near Mendoza, on a political charge, and having been first induced to attempt an escape, were brought to trial and executed 18 March 1818. José Miguel raised a body of troops to revenge their death, and a conspiracy was formed in his favor; but it was detected and suppressed, and he himself being defeated and taken prisoner, was executed on the same spot as his brothers.

Carrera, Rafael, Guatemalan revolutionist: b. Guatemala, 1814; d. there, 14 April 1865. He was of mixed Indian and negro blood. In 1837 he placed himself at the head of a band of insurgent mountaineers. Enlisting the sympathies of the Indian population, the rebellion spread. Carrera was in turns courted and caressed by members of the opposite factions which divided the government. In February 1838, he occupied the city of Guatemala with 6,000 Indians, and succeeded in restraining his followers from anticipated pillage and massacre. Having secured his victory, he became dictator in 1840, and from 1844 to 1848 was president of Guatemala; was re-elected in 1852, and made president for life in 1854. He recalled the Jesuits, who in 1767 were banished, and in 1863 he engaged in war with Salvador. After capturing San Salvador, the capital, he deposed President Barrios and appointed Dueñas in his stead.

Carrera, Valentino, văl ĕn tē nō kär-rā'rā, Italian dramatic poet: b. Turin, 19 Dec. 1834. He is one of the most original dramatists of Italy, especially in comedy. Among his many comedies, vaudevilles, etc., the play which won for him a wide reputation was 'La Quaderna di Nanni' (1870), a perfect picture of Florentine life. He has also written some historical sketches and narratives of travel.

Carrere, John Merven, American architect: b. Rio de Janeiro, Brazil, 9 Nov. 1858. He was of American parentage and his education was obtained in Switzerland. He graduated from the École des Beaux Arts, Paris, in 1882, and since 1884 has been a partner in the firm of Carrere & Hastings, New York. The firm designed the Ponce de Leon and Alcazar hotels at Saint Augustine, Florida, and are the architects of the New York Public Library at Bryant Square.

Carrhæ, kär'rē, the name of the site of an ancient city in northwestern Mesopotamia, supposed to have been the biblical Haran.

Carriacou, kär-rē-ą-koo', the largest of the Grenadine islands, in the British West Indies, seven miles long and from two to four broad. It is well cultivated, and produces good crops of cotton. The town and harbor of Hillsborough are on its west side.

Carriage, a general term for vehicles of all sorts, especially wheeled vehicles; in a narrower sense confined to those vehicles that carry persons only, for pleasure or business. The carriage is as old as the wheel. The first man who cut two slices from a tree-trunk and mounted them on an axle was the builder of the first carriage. The early Egyptians and Assyrians knew how to make wheels, as evidenced by carvings on their monuments. Some of these show a wheel made with tire and spokes, a construction indicating considerable mechanical knowledge.

Wheels held in place by wooden pins in the axle, a pole to which the horses were attached, and a rude box open at the rear, constituted the early chariots. These and the primitive carts were always two-wheeled. Four-wheeled carriages came into use with the formation of comparatively smooth roads, being ill adapted to rough and unkept highways. The earliest vehicles were made almost wholly of wood, pinned together, the holes being often burned in, and the parts tied with thongs. The Romans made use of the two-wheeled *carruca* (from which word "carriage" is derived), but although chariots of war and carts for transportation were comparatively common from early times, the carriage proper, for conveying persons, was in very slight use before the 16th century.

As late as 1550 there were only three coaches in all Paris, and the stage coach did not make its appearance in England until 1555. When the coach and covered carriage first came into use they were considered fit only for women and children, men scorning to seek such protection from the weather as is afforded by a covered vehicle. By the opening of the 17th century the coach had become popular, and not only crowned heads, but titled families, commonly employed them, emblazoned with their arms and decorated to the highest degree. Some of the most beautiful and elegant handiwork of that period was expended in the ornamentation of coaches. Elaborate painting, upholstery, and joiner-work combined to pro-

duce the most sumptuous of vehicles. No such extreme effort at display has characterized carriages of later generations.

About 1625 the hackney coach came into existence in London, and the hired cab soon became an established institution. The increase of post-roads and general improvement in highways caused a gradual increase in private carriages and wheeled vehicles of all sorts during the 17th and 18th centuries. The bodies of these early carriages and coaches were suspended by leather straps, and depended on these, in combination with the springiness of the timber employed, to reduce the shocks and jolts to the occupants. That they were jolty enough to afford considerable exercise can be testified to by those who have taken up the modern sport of coaching in imitation of the old-time tally-ho coach. About 1700, steel springs were introduced, but they did not make very rapid headway. The C spring was a radical improvement, but gave way to the elliptic spring, which was invented in 1804 and remains in use to the present day. The rubber-tired wheel was borrowed from the bicycle about 1875, and still further added to the comfort of carriage riders, while the pneumatic tire of more recent date affords the latest refinement of comfort.

The various wheeled vehicles that may be grouped under the name "carriage" embrace a wide nomenclature, the best known being here grouped:

Auto-carriage, an automobile carriage. See AUTOMOBILE.

Barouche, a four-wheeled, falling top carriage, with low body, two inside seats facing, and an outer driver's seat.

Berlin, a four-wheeled covered carriage having a rear seat behind the body.

Britzska, or *Breet,* a four-wheeled Russian carriage with falling top and a rear seat uncovered.

Brougham, a four-wheeled covered carriage with outer driver's seat, and the fore body cut under so as to turn short. The *miniature brougham* seats only two.

Buckboard, a very simple form of carriage, in which a springboard or boards take the place of the springs, the seat being placed in the centre of the springboard.

Buggy, a light carriage with either two or four wheels, and with or without a top.

Cab (short for *cabriolet,* but of more general meaning), a carriage licensed to carry passengers for hire, usually closed, with an outer driver's seat.

Cabriolet, a two-wheeled (later four-wheeled), two-seated, covered carriage with falling top.

Calash, or *Calêche,* a two-wheeled carriage with a falling or folding top, a seat for two passengers, and a narrow seat on the dashboard for the driver; much used in Canada. The top itself is also called a calash.

Car, (1) a railway carriage; (2) a carriage of unusual magnificence, as for use in a procession; (3) a van; (4) one of various special forms of vehicle, as the Irish jaunting-car.

Cariole, a small, light, open carriage, somewhat resembling the calash.

Carryall, a four-wheeled covered carriage, light and commodious, having two or more seats.

Cart, (1) a two-wheeled, light, topless pleasure vehicle; (2) a heavy two-wheeled springless vehicle, with a strong box, for carrying rough material.

Chaise, originally a two-wheeled, one-horse vehicle with a top, the body being hung on straps; later, a light, topless, four-wheeled carriage of varying construction.

Chariot, the early two-wheeled war-carriage; also a light 18th-century coach, with one inner seat and a driver's seat.

Coach, a four-wheeled covered carriage of large size, having two or more inner seats and one or more outside — a tally-ho; also, a two-seated four-wheeled cab, or large hack.

Coupé, a four-wheeled carriage, low-bodied, with an outer driver's seat.

Curricle, a simple form of two-wheeled two-horse carriage.

Dog-cart, a light pleasure cart with back-to-back seats, the rear seat covering a box to carry a dog or dogs.

Drag, a form of coach or tally-ho, sometimes uncovered.

Drosky, a long-bodied, four-wheeled Russian carriage. In its primitive form the body is a plank on which the passengers ride astride; also, in some European cities, a public hack.

Fiacre, the French name for a public cab.

Gig, a very light, small-bodied, two-wheeled, one-horse vehicle, with seat for one.

Hack, a hackney coach; loosely, any cab.

Hackney Coach, a four-wheeled coach kept for hire.

Hanson, or *Hansom Cab,* a two-wheeled, low-bodied, one-horse, covered carriage, having a single seat, closed in with front doors, and seat for the driver behind.

Jaunting-Car, a light two-wheeled, sometimes four-wheeled, vehicle having a perch in front for the driver, and longitudinal seats extended over the wheels, and a well between them for baggage.

Landau, a coach-like vehicle having a top, the forward part of which is removable and the rear part folding.

Landaulet, a one-seated landau.

Omnibus, a four-wheeled covered carriage with long body, seats running longitudinally, a rear door with steps; often with seats on the roof.

Phaeton, a light pleasure carriage of varying construction, usually low-bodied.

Rockaway, a four-wheeled pleasure carriage with two seats and permanent top.

Sociable, a four-wheeled topless pleasure carriage, with facing seats.

Stage, a four-wheeled carriage of large size, with several seats inside and on top, for long journeys; called also stage coach; loosely, an omnibus.

Sulky, a two-wheeled carriage, of skeleton construction, with a seat for one directly on the shafts.

Surrey, a light four-wheeled box carriage with two seats, and often side-bars.

Tally-ho, a four-in-hand coach.

T Cart, a pleasure cart having a T-shaped body.

Trap, a pleasure carriage; a term used very loosely.

Van, a very large covered wagon for conveying bulky articles, as furniture.

Victoria, a four-wheeled carriage with falling top, a seat in the body for two, and an elevated driver's seat cut under.

Wagon, a heavy four-wheeled vehicle, usually with rectangular box, for carrying goods, sometimes with removable seats, and often with removable top.

Wagonette, a light wagon for pleasure riding, with longitudinal seats facing each other, and entered by steps and a door in the rear.

To these might be added many more compound names, as top-buggy, box-buggy, post-chaise, etc. It is difficult sometimes to draw the line of distinction absolutely between many of the forms of carriages here named. Even the very common names of "coach" and "cab" overlap in use, that which one would call a cab in one part of the country being known as a coach in some other section.

The important parts common to the typical form of carriage are as follows: Body, seat, top, hood, dashboard, apron, step, springs, running-gear, perch, forward gear, clip, fifth-wheel, tongue, shafts, swingletree, doubletree, axle, wheel, hub, spoke, felloe, tire. The body of a carriage is commonly made of selected hard wood, ash, oak, hickory, etc., being preferred. It is put together with iron braces, screws, mortises, and tenons, and glue. The top, if permanent, is supported on selected wood uprights, or, if falling, is framed of iron or steel rods that fold up and open into a braced position. Leather, canvas, and leatherette are used as coverings. The gear, axles, shafts, poles, etc., are commonly of wood, selected with special reference to straight grain and consequent strength. The parts are largely reinforced with metal at all points where special strength or resistance to friction is essential. The tendency is to increase the use of metal to replace wood, and many carriages are made with steel axles and side-bars.

The fifth-wheel is the circular device in which the forward axle turns, and is made of iron or steel. The axles have metal boxes, which in the old style are lubricated with axle-grease, but in many modern vehicles roller-bearings are being substituted, that run with very little or no lubrication. The regulation wooden carriage-wheel has spokes let into the hub and felloes, the whole being held together by the pressure of an iron tire. Instead of making a wheel in the form of a flat disk, the practice is to make it dishing; that is, with the spokes inclining slightly away from the body of the carriage. The reason for this is that a vehicle wheel that is one of a pair receives the most strain when the vehicle is on an incline tipped to one side. In this position of severest strain the spokes of the wheel on the lower side nearest the ground, bear the weight, and when dished are inclined to the best position to receive the load.

This dishing of the wheel produces a necessity for placing the axle box slightly out of alignment. A dished wheel running on a straight axle tends to bear against the end nut, and work off the axle. By drawing the axle skein slightly inward at the forward side this tendency is overcome, and the wheel runs true. The wire wheel, or bicycle wheel, as it is commonly called, is made on a different principle, and dishing of the spokes and drawing of the axle are unnecessary. In these wheels the hub may be regarded as suspended from the tire, and the wire spokes are so spread that they receive the strains due to an inclined roadway to as good advantage as would the spokes of a dished wooden wheel.

Previous to 1850 most carriages were built by wheelwrights, assisted by blacksmiths, and the wheelwright's shop was to be found beside the blacksmith's shop in nearly every village. The development of carriage manufactories has changed all this, and the occupation of the country wheelwright is almost gone, a few remaining who do simply a general repairing business. The carriage factories buy their lumber and hardware and supplies in large quantities, and use up the raw material in a more economical manner than could the wheelwright. But their greatest advantage is the use of special machinery. In tirework alone there are four special machines employed, the tire-bender, tire-setter, tire-upsetter, and tire-shrinker. Special lathes have been designed for turning out spokes, axles, hubs, etc., and there are hub-borers and templates, and all the conveniences equivalent to those used in the construction of general machinery. Amesbury, Mass., is a centre of carriage manufacture, but there are factories scattered through various parts of the United States.

The term "railway carriage" was commonly employed in the early days of railroads, and is still in use in Great Britain, where "coach" is, however, the technical word, but in the United States it has given way almost wholly to the shorter and more distinguishing "car" (q.v.).

The most recent development in carriages is the auto-carriage, or automobile (q.v.).

For further information as to carriages and carriage-building, see Richardson, 'Practical Carriage Building' and 'The Blacksmith and Wheelwright.'

Carriages of Machines.— The term "carriage" is also applied to any traveling or moving part of a machine that serves to carry or transport something, usually back and forth. In this sense carriage is to be distinguished from "conveyor," which is applied to more or less similar devices for transporting something that is picked up at one point and dropped or discarded at another. Examples of machine-carriages are the lathe-carriage, being that part of the lathe that travels back and forth, carrying the cutting tool; the carriage of a planer or shaper, performing a similar office; and the typewriter carriage, being the moving part that supports the sheet of paper and the platen.

C. H. COCHRANE.

Carriage and Wagon Industry. From the earliest times of which there has been any historical record, mankind has utilized wheels as a means of transportation. On the great sculptured stones now in the British Museum, taken from the ruined city of Nimrod near Nineveh, can be seen, besides the innumerable war chariots, carts drawn by oxen, and carts drawn by men. The writer made a drawing of one of the latter kind, which shows very good construction. The wheels have six spokes and are well proportioned; probably they were about 42 inches high. The body is framed up with posts and a top rail, and the spaces are filled with handsome wickerwork. There is an arched guard over the wheel to protect the latter from contact with the overhanging load.

The cart is loaded with logs of wood. On another slab is shown the king's chariot, with an elegant canopy over the royal head. This chariot carries, besides the king, the charioteer and an arms-bearer. In biblical history the chariot is very frequently referred to, those of the great army of Pharoah being engulfed in the Red Sea. It is worth noting that the word "carriage" was at one time used in the sense of goods or baggage, and we find in the New Testament, "After those days we took up our carriages and went up to Jerusalem." The Greeks and Romans were, of course, familiar with the horse-drawn vehicle, and in the story of the Trojan war we find Achilles dragging the body of Hector, lashed to his chariot, around the walls of Troy. Carriages without wheels were used as late as the 17th century, when they were known as litters, having shafts behind and before, which were supported upon the backs of the horses. The litter was but a form of the sedan chair, itself a species of carriage. If we look for a carriage with wheels but without horses, we find it in the jinrikisha of Japan, a unique vehicle drawn by manpower. The ancient chariot, with all its splendor of decoration, was but a two-wheeled cart without springs, and this, the starting-point in the evolution of the carriage, we find among many barbaric peoples, the wheels being formed of solid wood rendered circular when nature formed the trees from which they were made. Even the triumphal and funeral cars of early history were but springless carts; and ages of progress lie between a gorgeous chariot of the Cæsars and a modern buggy. Queen Elizabeth's wonderful state coach, with its highly ornamented and canopied body, was without springs. It was a sort of triumphal car for state parades. Her usual mode of locomotion was by water or on horseback.

The various forms which the modern carriage has assumed appear to be almost limitless. The old-time stage-coach has developed into the fashionable drag or tally-ho; the post-chaise and the curricle are no more; but there are still left to us innumerable forms of vehicles, of which the American buggy is perhaps the most useful and represents the highest development of the carriage-builder's art. Many of the forms came to us from England, notably the brougham, named for Lord Brougham. The landau takes its title from the town of the same name in Germany, where it was first made. A few specimens of the Irish jaunting-car have found their way to America, where they serve to remind us of the active nation with which they are popular. The hack as a name is solely American, but is of course a lineal descendant of the English hackney coach. See CARRIAGE.

Carriage-building, as an art, began to be developed in all parts of Europe about the middle of the 17th century. Steady but slow progress was made in all the great cities, and some almost elegant forms are shown in the old prints, profusely decorated. The running parts, however, were very imperfect. The first relief from the jolting of the dead-axle carriage was accomplished by suspending the body of the carriages on long leather thoroughbraces stretched from upright iron jacks which stood up from each end of the running part. The next improvement was made by transforming these stiff iron jacks into spring jacks, and by making them of steel plates. Finally, in the early part of our own century, the spring jack was given a bold, sweeping curve, and the beautiful C spring evolved. The Collinge axle, now in common use all over the world, was perfected almost 100 years ago, and the elliptic spring, the best of all springs, was invented at about the same time. It was early in the 18th century that the post-chaise came into use for journeying, and the hackney coach and hackney cab came to take the place of the sedan chair in the great cities. This created quite a war in London between the watermen and the chairmen on the one side, and the coaches on the other.

In very old times the post-chaise had a small body hung very high on its leather straps; the wheels were very high and far apart, and the postilions rode the "near" horses. In later times this uncouth post-chaise developed into the elegant chariot, perhaps the most perfectly formed carriage ever built. This carriage, with its gorgeously draped coachman's seat, as well as the full coach similarly mounted, is now seen only at royal receptions and other state occasions in the capitals of monarchical countries. As with other inventions, the evolution of the carriage has taken place by fits and starts, the greatest progress having been made during the present century, and the field in which that progress occurred having been the United States of America.

The volume of business done by American carriage manufacturers in 1795 was exceedingly small. Technical knowledge was not wanting, however, for there were many shops which had been established in colonial days, where fine carriages were occasionally built, and many imported French and English vehicles repaired. But business languished for lack of customers. Before the War of the Revolution the rich shipping merchants of Salem, Boston, Newport, New York, Philadelphia, Baltimore, and Charleston lived in good style, as was common in those monarchical times, and imported in their own ships coaches, chariots, and phaetons, from England and France. Repair shops sprang up in all the large towns and cities, and skilled workmen came from England, Ireland, and Scotland, finding ready employment on their arrival.

A curious bit of history, clearly showing the use of carriages in New York city in 1770, came to the writer's knowledge some years ago from the late George W. W. Houghton, who embodied the facts in a lecture delivered before the New York Historical Society. The old record, which he somewhere discovered, gives a list of 59 owners of carriages; and the vehicles mentioned were 26 coaches, 33 chariots or post-chaises, and 26 phaetons — in all, there were 85 vehicles. The names of the owners were Cadwallader Colden, Daniel Horsmanden, John Watts, Oliver De Lancey, Joseph Reade, Charles W. Apthorp, Colonel Roger Morris, Henry Cruger, John Cruger, James De Lancey, the widow of Governor James De Lancey, the widow of William Walton, the widow of Judge John Chambers, the widow of James McEvers, the widow Lawrence, Mrs. Waddell, Andrew Elliott, William Bayard, Nicholas Bayard, Philip Livingston, John Livingston, Robert G. Livingston, Walter Rutherford, Gerardus Beekman, Colonel Beekman, Nathaniel Marston, John

Marston, Rev. Dr. Ogilvie of Trinity Church, Anthony Rutgers, Jacob Le Roy, David Johnson, William Axtell, Miss Lodge, Leonard Lispenard, Samuel Verplanck, Lawrence Kortright, David Clarkson, John Van Cortlandt, Robert Murray, James Jauncey, Dr. William Brownjohn, Dr. Jonathan Mallet, Thomas Tiebout, Jacob Walton, John Watkins, Nicholas Gouverneur, John Aspinwall, Hugh Wallace, Isaac Low, A. Van Cortlandt, Gerardus Duyckinck, Gen. Gage, John Read, Archibald Kennedy, Thomas Sowers, Captain John Montressor, John Leake, Abraham Montier, and Ralph Izard. Many of these names are familiar to the New Yorker of to-day, the prestige of the old families having kept pace with the march of events.

It will be observed that there were but three styles of carriages known among the old aristocracy, and they were all for town use. No similar records are to be found in other cities, but there are many ancient relics of grand chariots now to be found in Boston and vicinity, still preserved in the stables of the old families as curiosities.

The effects of the struggle for independence, and the hard times which followed, so impoverished the people that there was but little use for carriages of luxury in the early days of the present century. The tendency of all classes was essentially democratic, and rigid economy was esteemed a great virtue. This state of things was not favorable for the makers of fine carriages; but, fortunately for them, all well-to-do people required something to ride in, and that took the form of the two-wheeled chaise, immortalized by Dr. Holmes. These were in great demand as the country grew prosperous, and were built in large numbers in Boston, Salem, Worcester, Pittsfield, West Amesbury, Mass., New London and New Haven, Conn., as well as in Wilmington, Del., and Philadelphia. They had enormously high wheels, and the tops were stationary, being supported on iron posts. Curtains of painted canvas or leather covered the sides and back. These chaises were often built without dashers or aprons in the earlier times, but in later years they had falling tops and were gay with silver plate. So universally was this style of carriage in use that most carriage-makers were known as "chaise-makers," as the old signboards of 50 years ago plainly indicated. Chaise-making throve mightily, and up to about 1840 it seemed that nothing could ever fully supplant the favorite old two-wheeler. But the buggy, which had been struggling for existence for several years, began to come to the front.

The chaise had been for generations of nearly the same form, no radical changes having been tolerated; but the buggy came in a multitude of forms, as it was new and without any recognized standard of shape to hamper the fancy of the builder. At last the door was open for novelties, and has since been still wider open, with no signs of being closed again.

The buggy is purely American in its origin, and is without doubt the greatest achievement of American carriage-makers. The body may be of any form, but the running part is always of the same, or nearly the same, type. Its common-sense construction is wholly unlike the work of any other country. It is simpler, lighter, stronger, and cheaper than any other style of vehicle, and is so admirable in all respects that it is not likely to go out of use for at least another century.

In the early days of this century of progress a great stimulus was given to the carriage and wagon trade by the advent of the grand old stage-coach. It was elegant in form, gay with paint and gilded scrollwork, and when starting out on its journey, rocking on its tough thoroughbraces under its load of passengers and baggage, with its team of four or six Morgan horses, it was an inspiriting sight. It has been said that the stage-coach was unknown in America prior to 1810, but this is a mistake. In 1776 John Hancock stole away from his duties in the Continental Congress to Tamfield, Conn., where he married the beautiful Dorothy Quincy, and took her on a wedding journey to Philadelphia by stage-coach. The incidents of the journey, including the upsetting of the coach, are duly set forth in the record of William Bant, attorney to Gov. Hancock. It is also related that Mrs. Hancock took a similar journey with her son, who was but two weeks old, to join her husband in Philadelphia. This was in 1778. The roads, however, at this early date, were little better than bridle-paths, and the chief resource for journeying was the saddle. In 1791 there were but 1,905 miles of post-roads in the States, and in these roads were many bottomless sloughs, and corduroy bridges consisting of round logs laid crosswise over swamps, sometimes for long distances. As the government and local authorities improved and extended the roads, some sort of public conveyance followed.

In New York, New Jersey, and Pennsylvania the great Conestoga wagon, broad-wheeled, and with huge canvas-covered body, was drawn over the rough roads by six or eight horses or oxen for the transportation of freight and passengers. This wagon was the prototype of the famous "prairie schooner," or emigrant wagon, of later times.

Government roads, called military roads, were built across the mountains of Virginia, connecting the East with the valley of the Ohio; also through the great forests of Maine to the town of Houlton on the New Brunswick frontier, and in many other parts of the country. They were for postal and military purposes. On all these were quickly established thriving stage lines, and the business grew very rapidly. Capital was freely invested in the varied interests directly and remotely connected with the innumerable lines which radiated from all the chief towns and cities in the country; and the investments paid good dividends.

The carriage-maker, the harness-maker, the horse-breeder, and the jolly old country tavern-keeper, with his good dinners, his well-stocked and well-patronized bar, all seem to have been prosperous and happy in the good old slow-going time.

Stage-coaches and wagons were built in many places at the time I write of. Salem, Mass., was early in the field. Osgood Bradley, of Worcester, was a large builder; the Troy coach, of Troy, N. Y., was very famous in its day; but a little later, and still more famous came the Concord coach, of Concord, N. H. The founder of the house of Abbot, Downing

& Company, now the largest wagon-builders in New England, whose work is known throughout America as well as in South Africa and Australia, was Louis Downing, who moved to Concord from Salem, Mass., in 1815. There he began the manufacture of coaches and wagons; and after 80 years, this old house is still in the full tide of active business.

So great was the coaching business from 1810 to about 1845, that in addition to the builders hundreds of smaller shops derived their chief income from repairing and painting these fine old road coaches. See COACH.

After the War of 1812, trade and commerce entered upon a new career of prosperity. The shipping merchants were piling up wealth; manufacturing, which had grown strong by the fact that the war had thrown us wholly on our own resources, was opening up new sources of wealth, and again stylish carriages for city use were in demand. Fine coaches and chariots, hung on C springs, and made grand with the hammer-cloth coachman's seat, were built in all the large cities. Boston had two well-equipped shops for this kind of work; New Haven and Bridgeport were active and growing; Newark, N. J., became celebrated for its fine productions; and New York, Philadelphia, Baltimore, and Wilmington, Del., were supplying their own wants and sowing the seeds of greater development in later times.

About this time a considerable export trade grew up with the West Indies. The carriages shipped there were known as volantes, and were large two-wheeled vehicles with immensely long shafts. The wheels were placed so far in the rear of the vehicle, in order to give greater freedom of access, that the shaft horse had a very large share of the weight upon his back. In addition to this, the overloaded beast carried the postilion, while the leader did most of the hauling. These carriages were shipped by the sugar and molasses merchants of the northern cities to the planters of the West Indies in commercial exchange for their product, which was speedily converted into rum, then in great demand at home and abroad. Thus the carriage-maker played his part in the interchange of commodities, and trade flourished.

Farmers' wagons and carts had been made in every village in the country since the earliest time, but wagon-making as a great business began with the development of the Western States. First came the large emigrant wagon, and after that the lighter farm wagon, and, later still, wagons for the great overland current emigration, which flowed like a mighty river from the East to the gold-fields of California. Happily for the emigrants, the wagon-makers of the West were equal to the occasion. Great factories quickly grew up, stimulated by this additional demand, and among the rest the great house of Studebaker Brothers, which had its origin as far back as 1813, now came to the front, reorganized and ready for business. This firm, now the largest wagon and carriage manufacturers in the world, was just in time to take a leading part in supplying the government with army wagons for the western regiments in the Civil War. It was due to the thorough equipment of the wagon-makers of the country that the armies of the North were better and more properly supplied with the means of transportation than any army in military history. Wagon-building is so vast in its proportions that when one visits such an establishment as that at South Bend, Indiana, he wonders where purchasers can be found for so many vehicles, a wagon being produced every 10 minutes in this one factory.

The older men of the present generation of carriage-makers have witnessed a great change in the extent as well as in the method of manufacturing. In the early years of the century, business in the old carriage towns was done on what is called the "dicker" system. Woodworkers, blacksmiths, trimmers, and painters, each did business on his own account, and swapped parts, as they termed it, the final settlements being made in finished carriages. The dealer in materials also took carriages in payment. The workmen were paid with orders for goods, and money was almost unknown in all the various transactions. The old operators, who did business in this way, used to say that the plan was much safer than the cash system, there being fewer failures and less danger of getting involved in debt.

By and by the small operators with their little shops went the way of all old-time things, and well-organized factories succeeded them. Then a multitude of inventions in machinery were eagerly taken up and utilized. Larger and larger grew the factories, more and more perfect the machinery, until the present time, when the limit of quick methods and cheap production seems to be well-nigh reached. But the end is not yet.

Much the larger number of carriages built in the great factories where machinery is employed are built in duplicate by the million, and are sold to the million at exceedingly low prices. Of course, there are many qualities among the vast variety of vehicles built by the new processes, and many grades of stock enter into their composition. As in all other manufactures, the price is a very fair indication of quality. One might think that in the rush for low prices of both builders and buyers all really good work would be superseded by low grades, and that the tendency would be steadily downward in quality; but such is not the fact. Fine work — I may say superb work, that which taxes the highest skill and care of the best designers and mechanics — is still in great demand, and will probably continue to be for all time.

There are many builders of high-grade work widely known by the public, of whom I should be glad to speak, and who are distinguished for their excellent productions; but I will name only one, easily the first in this or any other country — Brewster & Company, of New York. A visit to this great establishment — of which all American carriage-builders are justly proud — will show the appreciative observer to how high a degree of perfection, beauty, and completeness modern carriage-building has attained.

In 1872 the leading carriage-makers of the country formed an association called the "Carriage Builders' National Association." The

good that this organization has accomplished by means of its annual conventions can scarcely be estimated. All trades which have similar associations know the value of good fellowship and good feeling among competitors instead of the old-time jealous antagonism. Very early in the history of the association the decay of the useful old apprenticeship system was recognized; and as a substitute for this past method of training workmen a fund was raised by subscription for a technical school, to be established in New York city, to teach the science of carriage drafting and construction. This school has been a great success. Under able teachers a large number of talented young men have graduated, well equipped to take charge of the constructive departments in our factories. Thus scientifically trained foremen and whirling machinery now very largely take the place of the skilled workmen who formerly occupied our benches, each working by his own methods, carefully guarded, in which there was more of the rule of thumb than of science.

It is fortunate for the graduate of the technical school when, in addition to the knowledge gained in the course of his studies, he has the inborn faculty of producing new and beautiful forms; that keen sense of fair proportions and graceful lines which is the necessary qualification of a designer. Few things fashioned by human skill are more beautiful than a fine carriage; none but a true artist in his line is fit to determine its form, and none but an expert mechanic, painstaking and honest, is fit to supervise its construction. The light-weight carriages now required, the tremendous strain and rough usage which they must undergo without a sign of weakness, require the most carefully selected stock and the most watchful care in all the details of mechanical arrangement.

The volume of business done by all the carriage-makers in the country is clearly shown by the last census report, from which the following figures are taken:

AMERICAN CARRIAGE AND WAGON TRADE.

Number of establishments	7,632
Total number employed	66,842
Number of wage earners employed	62,540
Officers, clerks, etc	4,302
Capital employed	$118,187,838
Miscellaneous expenses	6,261,469
Wages of workmen	29,814,911
Salaries of officers, etc	4,073,932
Value of all products	121,537,276
Cost of materials	56,676,073
Value of family and pleasure carriages	51,504,176
Value of business, farm, municipal, etc., wagons	31,480,157
Value of automobiles, etc	4,680,276
Repair work	25,192,057

That the volume of business done in the carriage trade at the present time is fully equal to the wants of the community is evident from the exceedingly sharp competition among builders and dealers. The business, however, will certainly continue to grow as fast as the increased capacity of the purchasing class can be made to absorb the increased product.

Given that prosperity which our country and her beneficent institutions insure us, if wisdom rules, a continued advance will be made, a wider and wider market will be open to us, greater novelties will be forthcoming to tempt the lovers of new things, greater perfection will be attained, and a greater number of our hard-working fraternity will find good employment with satisfactory returns.

CHAUNCEY THOMAS,
Chauncey Thomas & Co., Boston.

Car'rick, Scotland, the southern district of Ayrshire. The surface is mountainous, but in the valleys and along the shores of the Atlantic the ground is level, with a fine clay or loamy soil. It became the property of Robert Bruce, father of the Scottish king of that name, by his marriage with the heiress of the Earls of Carrick; and this title is still royal, being assigned to the eldest sons of the kings of Great Britain.

Carrickfergus, kăr-rĭk-fĕr'gŭs, Ireland, a seaport town in the county of Antrim, 10 miles by rail northeast of Belfast. It is a municipal borough, and also a county of itself, called the county of the town of Carrickfergus. It comprises an area of about 25 square miles, of which only 129 acres is embraced in the town proper, the remainder belonging to the territory of the county. The Bay of Carrickfergus is a small indentation on the north side of Belfast Lough. It is memorable in history as the landing-place of King William III., who disembarked on its shore at the quay of the town of Carrickfergus, on 14 June 1690. The castle stands upon a rock projecting into the bay, and is still maintained as a fortress, having a number of guns on the walls and a small garrison. The public buildings besides the Episcopal, Roman Catholic, and other churches, are a town hall, court-house, market-house, etc. Pop. (1891) 8,923.

Carrier, Common. See COMMON CARRIER.

Carrier, Jean Baptiste, zhŏñ bāp-tēst kăr-rē-ā, French Jacobin: b. Yolet, near Aurillac, 1756; d. Paris, 16 Dec. 1794. At the beginning of the Revolution he was an obscure attorney, but in 1792 was chosen a member of the convention. He aided in the establishment of the revolutionary tribunal, 10 March 1793, and exhibited the wildest rage for persecution. He voted for the death of Louis XVI., demanded the arrest of the Duke of Orleans, 6 April 1793, and contributed greatly to the outbreak of 31 May. On 8 Oct. 1793, he was sent to Nantes with a commission to suppress the civil war and finally put down the Vendeans. Multitudes, informally and precipitately condemned, were executed daily; but Carrier resolved to destroy the prisoners by numbers at a time and without a trial. He first caused 94 priests to be conveyed to a boat with a perforated bottom, under pretence of transporting them, but in reality with a view of having them drowned by night. This artifice was repeated a number of times, and the victims were of every age and of both sexes. These wholesale murders by drowning were called noyades. The executioners are also said to have sometimes amused themselves by tying together a young man and woman, who were then forced into the water; and they called the murders carried out in this way «republican marriages.» It has been estimated that 15,000 individuals perished in this manner. The banks of the Loire were strewed with the dead, and the water was so polluted that drinking it was prohibited. Out of terror people refrained for a time from drawing public attention to these

atrocities, but at last the truth began to become known, and Carrier was recalled. Shortly after the fall of Robespierre he was arrested and brought before the revolutionary tribunal, which condemned him to death, and he was guillotined accordingly.

Carriera, Rosalba, Italian painter: b. Venice 1675; d. 1757. She is chiefly known by her portraits in crayon. In 1705 she became a member of the Academy of St. Luke in Rome, and in 1720 of the Academy of Bologna. She visited Paris in 1720 and painted portraits of King Louis XV. and members of the court. She was elected a member of the French Academy and in 1721 returned to Venice. She was a great worker and toward the end of her life became blind from overwork.

Carrière, Moritz, German author: b. Griedel, Hesse, 5 March 1817; d. Munich 19 Jan. 1895. He studied philosophy at Giessen, Göttingen, Berlin, and in Italy. In 1849 he became professor of philosophy at Giessen and after 1853 held that position at Munich. He was a defender of Christianity, opposed Ultramontanism, and was of the liberal school. He also took high rank as an art critic. Among his published works are: 'Der Kölner Dom als freie deutsche Kirche' (1843); 'Abälard und Heloise' (1844); 'Die Religion in ihrem Begriff' (1841); 'Die philosophische Weltanschauung der Reformationszeit' (1847); 'Das Charakterbild Cromwells' (1851); 'Die Kunst im Zusammenhang der Kulturentwickelung und die Ideale der Menschheit' (1863–71); 'Geschmack und Gewissen' (1882).

Carrier-Belleuse, Albert Ernest, äl-băr ĕr-nā kā-rĕ-ā-bĕl-lĕrz, French sculptor: b. Anizy-le-Château 12 June 1824; d. Paris 3 June 1887. He was a pupil of David d'Angers, and while studying was compelled to earn his living by making models for the manufacturers of bronzes. Toward the close of his life he was director of the porcelain works at Sèvres. His works include marble sculptures and terra-cotta busts; among them are 'Angelica'; 'Madonna and Child' (in the Church of St. Vincent de Paul in Paris); 'Sleeping Hebe'; 'Forsaken Psyche'; and a number of busts of remarkable truthfulness to life.

Carrier-pigeon. See HOMING PIGEON.

Carrier Shell, or **Mason Shell,** a gastropod mollusk of the genus *Phorus,* which covers its shell with grains of sand, shell, coral, etc. These bits are fastened by an exudation from the mantle, and are apparently protective in their purpose.

Carrières, Louis de, French theologian of the Roman Catholic Church: b. Cluvilé 1662; d. Paris 11 June 1717. In 1689 joined the Congregation of the Oratory and became well known as a theologian. At the request of Bousset he published a 'Commentaire Littéral' (24 vols. 1701–16), reprinted Paris 1872.

Car'rington, Edward, American soldier: b. Charlotte County, Va., 11 Feb. 1749; d. 28 Oct. 1810. He was lieutenant-colonel of Gen. Harrison's artillery regiment, quartermaster-general under Gen. Greene, a delegate to the Continental Congress, and foreman of the jury in Aaron Burr's trial for treason.

Carrington, Henry Beebee, American lawyer, soldier and historian: b. Wallingford, Conn., 2 March 1824. He graduated at Yale in 1845; taught at Tarrytown, N. Y., 1846 and at Yale Law School 1847; began the practice of law in Columbus, Ohio, in 1848, and took an active part in the anti-slavery movement. In the convention which met in 1854 to organize the Republican party, Carrington was a member of the committee appointed to correspond with persons in the different States with a view of making the movement national. In 1857 he was Adjutant-General on the staff of Gov. Chase and organized the State militia in preparation for war. In 1861 he was appointed colonel of the 18th United States infantry, served through the Civil War, and afterward was in service on the plains; was wounded in war with Sioux Indians and retired in 1870; he became professor of military science and tactics in Wabash College, Ind., a position which he held till 1873. He has written: 'Russia as a Nation'; 'American Classics'; 'Ad-sa-ra-ka, Land of Massacre'; 'Battles of the American Revolution'; 'Washington the Soldier,' and other works.

Carrington, Paul, American statesman: b. Charlotte County, Va., 24 Feb. 1733; d. 22 June 1818. He was graduated at the College of William and Mary. During the Revolution he was a member of various conventions and of the Committee of Safety; opposed the Stamp-Act resolutions of Patrick Henry; became a member of the court of appeals, and in the Virginia convention voted for the adoption of the Federal Constitution.

Carrington, Richard, English astronomer: b. Chelsea, 26 May 1826; d. November 1875. Carrington entered Trinity College, Cambridge, in 1844, to prepare for the Church, but his scientific tendencies being awakened by the lectures of Prof. Challis he turned his attention to astronomy. He held the post of observer at the University of Durham from 1849 to 1852. He was elected a Fellow of the Royal Society (7 June 1860). His work 'Observations on the Spots on the Sun' (1863) furnished data that materially affected the study of solar physics.

Carrion-crow, any of several large carrion-eating birds. The only true carrion-crow (*Corvus corone*) is found in England. It is larger than a crow, of black plumage, and with feathered neck. It is seldom seen in flocks, and lives upon carrion, small mammals, eggs, and birds. In the southern United States the name is locally given to the black vulture (*Catharista atrata*), a bird closely related to the turkey-buzzard (q.v.), but smaller, and resembling it in habits and public service as a scavenger. Its bluish and spotted eggs number from one to three and are placed in a nest built under logs and bushes.

Carrion-flowers, certain species of the genus *Stapelia* (natural order *Asclepiadaceæ*), so called because of their putrid odor. In the United States the name is also given to the *Smilax herbacea,* a liliaceous plant.

Carroll, Charles, "of Carrollton," American patriot: b. Annapolis, Md., 20 Sept. 1737; d. Baltimore, 14 Nov. 1832. He attended several schools abroad; studied law in Paris and London, where he became a member of the Inner Temple; returned to his native country in 1764; was elected to the Continental Congress in 1775, and with the other members

signed the Declaration of Independence, on 2 August of the following year. To make certain his identity, he added "of Carrollton" to his signature, thus distinguishing himself from another by using the name of his family mansion. After many more years of important public service to the State of Maryland and to the new republic, in 1804 he withdrew to private life at Carrollton, which was his patrimonial estate, and where as his life advanced he became an object of universal veneration. He survived by six years all the other signers of the Declaration.

Carroll, Henry King, American clergyman and editor: b. Dennisville, N. J., 15 Nov. 1848. He was on the staff of 'Hearth and Home' (Methodist), and from 1876 to 1898 was religious and political editor of the *Independent.* He has written 'The Religious Forces of the United States'; and many reviews, reports, and miscellaneous papers. He supervised the compilation of religious statistics for the 11th census, and in 1898 was appointed to prepare a report on the internal conditions of Porto Rico. In 1900 he became a secretary of the Methodist Episcopal Church Missionary Society.

Car'roll, Howard, American journalist: b. Albany, N. Y., 1854. He began newspaper work in New York as reporter for the *Times,* of which he subsequently became special Washington correspondent. He has since held several responsible business positions and is the author of 'A Mississippi Incident'; 'Twelve Americans: Their Lives and Times.'

Car'roll, John, American prelate: b. Upper Marlborough, Md., 8 Jan. 1735; d. Georgetown, D. C., 3 Dec. 1815. He was a cousin of Charles Carroll of Carrollton, and first Roman Catholic bishop in the United States. At the age of 13 he was sent to Belgium to be educated. He was professor (1759–71) at St. Omer's and Liège, then, becoming a Jesuit, he was made prefect of the Jesuit College at Bruges. On the suppression of the Jesuits in 1774, he returned to the United States. In 1784, at the suggestion of Franklin, he was appointed superior of the Roman Catholic clergy in the United States; was made bishop in 1789; and in 1808 was created archbishop of the archdiocese of Baltimore. Georgetown College was founded by Bishop Carroll in 1791.

Carroll, John Joseph, American Roman Catholic clergyman: b. Enniscrone County, Sligo, Ireland, 24 June 1856. He came to the United States in infancy, was educated in St. Michael's College, Toronto, Ontario, and at St. Joseph's Theological Seminary in Troy, N. Y. He became assistant priest in the Cathedral of the Holy Name, Chicago, in 1880, and subsequently rector of St. Thomas' Church there. He is a Gælic scholar of prominence and has written 'Notes and Observations on the Aryan Race and Tongue' (1894); 'Prehistoric Occupation of Ireland by the Gælic Aryans.'

Carroll, Lewis. See DODGSON, CHARLES LUTWIDGE.

Carron Oil, a mixture of equal parts of linseed oil and lime water, much used as a dressing for burns. It has no particular advantages over other simpler and neater dressings, notably vaseline, or oxide of zinc ointment. Its name is derived from its use in the Carron Foundry, Scotland.

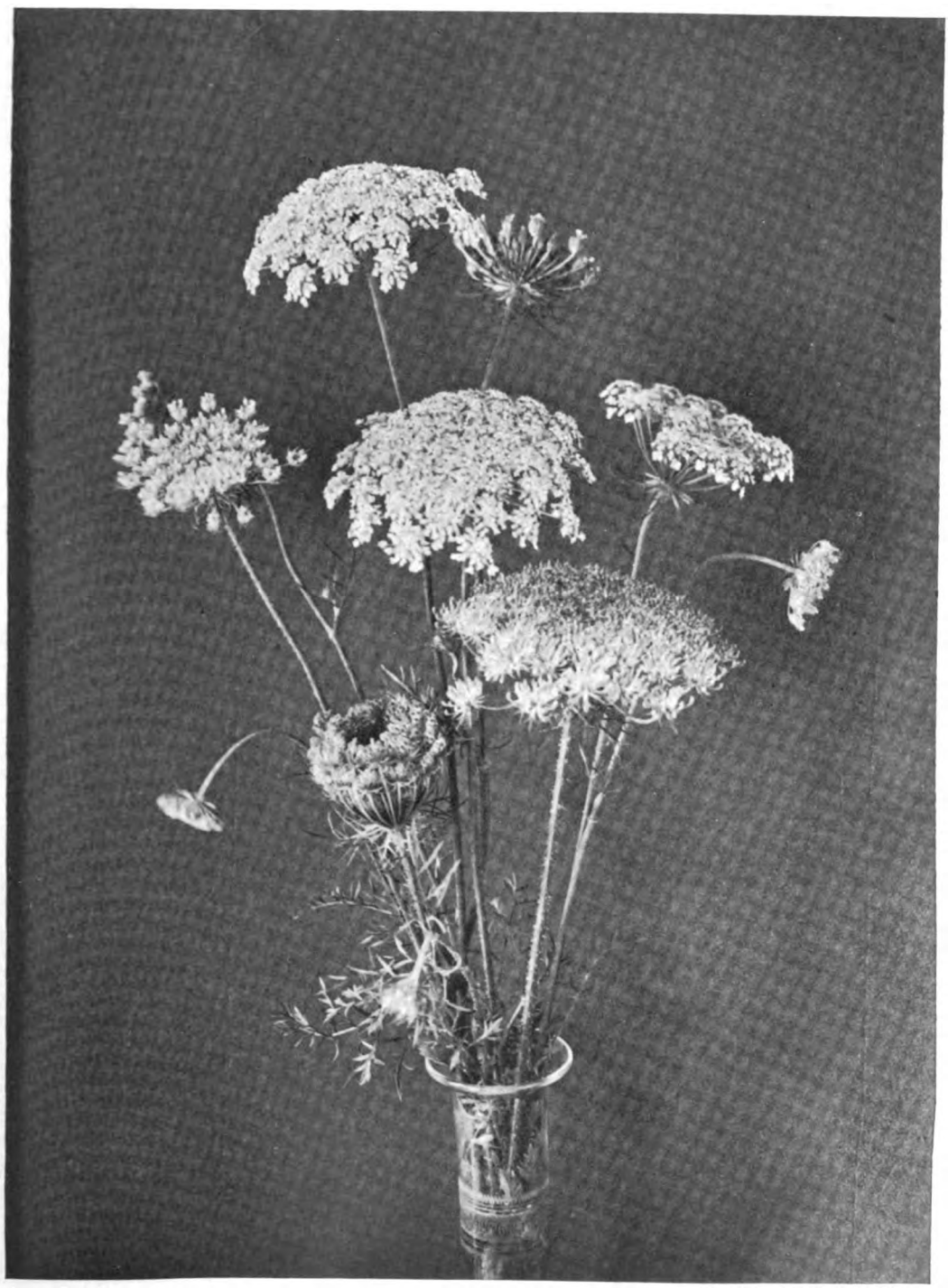
Carronade', an iron gun introduced in 1779 by the director of the Carron Foundry, in Scotland, from which it took its name, said to have been invented in 1752 by Gen. Melville, and first used in the American Revolutionary War. They were of large calibre, and lighter than common cannon; but they admitted of only a small charge of powder and had a very confined range. See ORDNANCE.

Carrot, a biennial plant (*Daucus carota*) of the natural order *Umbelliferæ.* It is a native of Europe, introduced into America, and is known as a troublesome weed upon poor land especially in the eastern United States. It is more favorably known by its cultivated varieties which are said to have been derived originally from Holland prior to the 16th century, since when it has become deservedly popular in all temperate climates. Certain large-rooted varieties are raised for stock feeding. The most popular culinary varieties are small, rapidly growing plants of diversely formed roots. Since they are most used as a flavoring in soups, stews, and other dishes which have not become specially popular in America, they are less cultivated here than in Europe, where these dishes are commonly made. The plants succeed best in a warm, friable, rich soil, well supplied with moisture, free from stones, weeds, etc., and in the best physical condition. The seed may be sown in drills one half foot apart as soon as the ground has become warm, since they are slow to germinate and since the seedlings are very tiny. A few radish seeds of an early maturing variety are usually planted with them to break the soil and indicate the positions of the rows, so that cultivation may be commenced early. The radishes are pulled when they reach edible size and the carrots given clean cultivation, the plants being thinned to stand two or three inches apart. When they reach edible size they are bunched and marketed. The larger growing kinds are planted in rows 24 to 30 inches apart and the plants thinned to 3 or 4 inches. When mature they are stored in pits or root cellars. Few diseases attack the carrot, and the few harmful insects are usually controlled by their parasites.

The average percentage composition of carrots is: Water 88.6; nitrogen-free extract, 7.6; carbohydrate, 1.3; protein, 1.1; fat, a trace; ash, about 1 per cent. They resemble other root and tuber vegetables in their succulence and nutritive value. They are greatly relished by stock, especially horses, but are usually replaced in American rations by cheaper foods.

Car'rotin. See CAROTIN.

Carrousel, kä-roo-sĕl', formerly an exhibition of various knightly exercises, as riding at the ring, throwing the spear, etc., which were celebrated at the courts of princes on festival occasions with great pomp and splendor. They are very ancient, but are first mentioned in history in 842, on occasion of the meeting held by Charles the Bold and Louis the German. They were superseded by tournaments, but when these had fallen were again revived. Their introduction or revival in France took place after tournaments had fallen out of fashion in consequence of the accident which ended in the death of Henry II. Similar fêtes had already



WILD CARROT.

long existed among the Moors, Spaniards, and Italians. These exhibitions were common during the continuance of the old French monarchy. The Place du Carrousel in Paris was so called from one of these fêtes given there in 1662, in honor of Mademoiselle de la Vallière. The greatest extravagancies were enacted at these displays. Recitations accompanied them, some verse in outrageous taste, and full of absurd allegorical personages, being usually recited in honor of the heroine of the fête, although genuine dramatic performances were sometimes given by professional actors. In the United States the name carrousel is applied to a merry-go-round, a machine with a revolving circular platform and fixed wooden horses, etc., upon which both children and grown people ride for amusement.

Carruth', Frances Weston, American writer: b. Newton, Mass., 12 July 1867. Since 1896 she has lived in New York, engaged in literary work. Her published volumes include: 'Those Dale Girls'; 'The Way of Belinda.'

Carruth, Fred Hayden, American journalist: b. Lake City, Minn., 1862. He was on the editorial staff of the New York *Tribune* 1888–92, and has been more recently editor of the humorous department of 'Harper's Magazine.' He has published 'The Adventures of Jones' (1895); 'The Voyage of the Rattletrap' (1896); 'Mr. Milo Bush and Other Worthies' (1899).

Carruth, William Herbert, American scholar: b. Ossawattomie, Kan., 5 April 1859. He was educated in the University of Kansas, and at Harvard, and has been professor of German in the former institution from 1887. He has published 'Schiller's Wallenstein with Introduction and Notes' (1894): and other German texts similarly edited.

Carruthers, kăr-roo'thẽrz, **William A.,** American novelist: b. Virginia, about 1800; d. Savannah, Ga., about 1850. He was professionally a physician, but wrote a number of spirited romances founded on incidents in American history. His best work is 'The Cavaliers of Virginia, or the Recluse of Jamestown, an Historical Romance of the Old Dominion' (1832). He is the author also of 'The Knights of the Horse-Shoe' (1845).

Carrying-trade, a phrase used in political economy, and also in commercial transactions. It usually refers to the commerce of different countries with each other, and is most frequently applied to carriage by sea. In a purely commercial sense the carrying-trade is simply the carriage of commodities from one place or country to another, irrespective of the mode of conveyance. In political economy the term is used in a special and restricted sense. In considering the entire commerce of a country it may be found that a part of that commerce is not directly with any one foreign country, but consists in supplying facilities for the conveyance of goods from one foreign country to another. The ships of the United States, for example, may be employed in carrying goods between India and China. This is called a carrying-trade. The carrying-trade does not consist merely in the occasional charter of vessels to foreign merchants for a foreign voyage. Though this may be included in it, its regular organization implies more than this. A shipowner, instead of lending his vessels incidentally to foreign merchants, may build or purchase them expressly for the purpose of conveying goods between different foreign ports at his own risk, and may even invest capital in merchandise to be so conveyed. It is to this abnormal development of commerce that the term carrying-trade in its restricted sense is applied. It is an investment of capital common in the case of commercial communities which have acquired great surplus wealth, or from the limited range of their territory, have few home investments. From the earliest time, the principal commercial communities, especially the great trading cities of antiquity, and those of the Middle Ages which have formed communities in themselves, have embarked largely in this kind of commerce.

Carryl, Charles Edward, American broker and author: b. New York, 30 Dec. 1841. He has been a member of the New York Stock Exchange from 1874 and has published 'Davy and the Goblin,' a very popular juvenile in the manner of 'Alice in Wonderland' (1884): 'The Admiral's Caravan' (1891).

Carryl, Guy Wetmore, American humorous writer: b. New York, 4 March 1873; d. New York 1 April 1904. He was a son of C. E. Carryl (q.v.), and the author of 'Fables for the Frivolous' (1898); 'Mother Goose for Grown-Ups' (1900); etc.

Carson, Christopher, popularly known as KIT CARSON, American mountaineer, trapper, and guide: b. Madison County, Ky., 24 Dec. 1809; d. Fort Lynn, Col., 23 May 1868. While yet an infant his family emigrated to what is now Howard County, Mo. At 15 years of age he was apprenticed to a saddler, with whom he continued two years, when he joined a hunting expedition. The next eight years of his life were passed as a trapper, which pursuit he relinquished on receiving the appointment of a hunter to Bent's fort, where he continued for eight years more. At the expiration of this time, he chanced to meet Fremont, by whom he was engaged as guide in his subsequent explorations. In 1847 Carson was sent to Washington as bearer of despatches, and received an appointment as lieutenant in the rifle corps of the United States army. In 1853 he drove 6,500 sheep to California, a difficult but successful undertaking, and on his return to Taos was appointed Indian agent in New Mexico. He served in the Federal army during the Civil War, attaining the rank of brevet brigadier-general.

Carson, Hampton Lawrence, American publicist: b. Philadelphia, Pa., 21 Feb. 1852. He was graduated at the University of Pennsylvania in 1871, and became a lawyer, rising speedily to prominence by speeches and addresses on topics of the time. He has written: 'History of the Supreme Court of the United States'; 'The Law of Criminal Conspiracies as Found in American Cases'; 'History of the One Hundredth Anniversary of the Promulgation of the Constitution of the United States'; and is a lecturer on law at the University of Pennsylvania.

Car'son City, Nev., a city, capital of the State and county-seat of Ormsby County; on the Virginia & Truckee R.R., 32 miles south-

east of Reno. The city is in a mining and agricultural district, and is the location of a branch mint, a Federal building, State capitol, State prison, an orphans' home, and an Indian school. The business is mainly connected with mining, agriculture, and lumbering. Here are railroad and machine shops, etc. Carson City is only 12 miles from Lake Tahoe, and, on account of its beautiful scenery at the base of the Sierra Nevada, is a popular summer resort. Pop. (1900) 2,100.

Carson River, a river of Nevada, rising in the Sierra Nevada and flowing northeast for about 150 miles. It then divides, and the main branch flows into Carson Lake, a small lake with no apparent outlet. The other branch flows in the opposite direction, and is lost in Carson Sink.

Carstairs, William, Scottish clergyman of political eminence: b. Cathcart, near Glasgow, 1649; d. 1715. He pursued his studies at the universities of Edinburgh and Utrecht. He returned to Scotland with the view of entering the ministry, but after receiving a license to preach resolved to return to Holland. As he was to pass through London, he was employed by Argyle and his party to treat with the English exclusionists and became privy to the Rye-house plot. On the discovery of that conspiracy he was apprehended. After a rigorous confinement in irons he was subjected to the torture, and endured this trial with great firmness; but being afterward deluded with the hopes of a full pardon, and assured that his answers should never be made evidence against any one, he submitted to make a judicial declaration. Being released he returned to Holland, and was received by the Prince of Orange as a sufferer in his cause. The prince made him one of his own chaplains, and procured his election to the office of minister of the English congregation at Leyden. He accompanied the prince in his expedition, and always remained about his person, both at home and abroad. During this reign he was the chief agent between the Church of Scotland and the court, and was very instrumental in the establishment of Presbyterianism, to which William was averse. On the death of William he was no longer employed on public business; but Anne retained him as her chaplain-royal, and made him principal of the University of Edinburgh. When the union of the two kingdoms was agitated he took a decided part in its favor. The memory of Carstairs is for the most part revered by his countrymen as that of an enlightened patriot; and few men of active power and influence have steered between parties more ably and beneficially.

Carstens, Asmus Jakob, Danish painter: b. St. Jürgen, near Schleswig, 10 May 1754; d. 26 May 1798. He was a miller's son, but received a superior education from his mother. He had a youthful passion for painting, but after his mother's death was placed in a mercantile house. After quitting his master, he went to Copenhagen, where he struggled on for seven years, supporting himself by portrait painting, at the same time working at a large historical picture on the 'Death of Æschylus.' He went to Italy after finishing this work, then lived at Lübeck for five years, toiling on in obscurity, when he was introduced by the poet Overbeck to a wealthy patron, by whose aid he went to Berlin, where the merit of his 'Fall of the Angels,' a colossal picture, containing over 200 figures, gained him a professorship in the Academy of Fine Arts. Two years' labor in Berlin enabled him to accomplish his cherished wish to go to Rome, and study the works of Michael Angelo and Raphael. His best works were designs in aquarelle, and painting in fresco; he rarely painted in oil. His cartoons at Weimar have been engraved by Müller. Homer, Pindar, Aristophanes, and Dante supplied him with his best subjects; and among the painters who endeavored to infuse a classic spirit into the fine arts of the 18th century, he holds a prominent position. His works are distinguished by correctness of form and outline, gracefulness of attitude, and loftiness and vigor of expression; but they frequently exhibit a certain harshness, arising from too close imitation. He was often defective in anatomy and perspective, and having begun late to paint in oil, was unacquainted with the secrets of coloring.

Cart, a carriage with two wheels, fitted to be drawn by one horse or other animal, and used in husbandry or commerce for carrying many sorts of goods. There are various descriptions of carts used in agriculture, and for many kinds of agricultural work the cart is preferable to the wagon. The ordinary cart for heavy goods has no springs, but there are many carts provided with springs.

Cartagena, kär ta jē'nā, Colombia, capital of the department of Bolivar, founded Jan. 21, 1533, by Pedro de Heredia. Early in the 17th century it ranked next below Mexico among the cities of the Western world, and was called "Queen of the Indies." At that time its inhabitants numbered about 20,000, of whom 3,000 were Spaniards; it was strongly fortified, and one of the main entrepôts of commerce between the hemispheres — a distinction due, in part, to its proximity to the Isthmian route, but even more to the excellence of its harbor, which is one of the best on the northern coast of South America. As the principal stronghold of Spanish America, it was repeatedly attacked: by a French fleet in 1544; by the English under Drake in 1585; again by the French in 1697; and by the English under Vernon in 1741. The town remained Spanish until 1815, when Bolivar took it; but the same year it was surrendered to the royalists, after a memorably heroic defense; and finally it was taken by Republican forces 25 Sept. 1821. Its population at present is little more than one half the number accredited to it three centuries ago. Cartagena is situated in lat. 10° 25′ 48″ N., lon. 75° 34′ W.

Cartagena, Spain, a city and fortified seaport and naval arsenal in the province of Murcia, and 31 miles south-southeast of the city Murcia. Its harbor is one of the largest and safest in the Mediterranean. The city, located at the northern end of the harbor, is surrounded by a lofty wall, flanked with bastions. The principal buildings are the cathedral, dating from the 13th century, now converted into a simple parish church; the old castle, supposed to date from the foundation of the city by the Carthaginians; the barracks, arsenal, presidio or convict establishment, the military hospital, the Hospital de Caridad, the artillery park, the

observatory, the convents of St. Augustine and Monjas, and several other convents and churches. Great improvements have been made recently in the accommodation for shipping by the construction of moles, wharves, breakwaters, and a floating dock. Lead smelting is largely carried on; and there are also in the neighborhood rich mines of excellent iron, which are connected with the harbor by means of a tramway about eight miles in length. Esparto grass, compressed by hydraulic power, is largely shipped; other exports are iron ore, lead and lead ore, copper ore, zinc ore, fruits, etc. Cartagena (ancient Carthago Nova) was founded by the Carthaginians under Hasdrubal about 228 B.C. It was taken by Scipio Africanus 210 B.C., and afterward became a Roman colony. In 425 A.D. the Vandals largely destroyed it; and in 711, after having been in possession of the Visigoths, it was again destroyed by the Saracens. When Spain possessed her colonies, and was in a flourishing condition, Cartagena was one of her most important naval stations, and carried on a very extensive commerce. In 1873 a body of communists obtained possession of the city and fortifications, but they were compelled to surrender in the following year. Pop., 100,000.

Cartago, kär-tä'gō, Colombia, a town in the valley of the Cauca, on the Viega, a tributary of that river. Its trade is principally in dried beef, pigs, fruits, coffee, cacao, and tobacco. The sugarcane thrives well here. Cartago is the entrepôt for the trade of Santa-Fe-de-Bogotà. The climate is hot, but dry and healthy. Pop. about 8,000.

Cartago, Costa Rica, a city, formerly capital of Costa Rica, on the right bank of a river of its own name, 14 miles east-southeast of San José. It was once a place of considerable commercial importance, and had a population of about 37,000. It was so ruined by an earthquake 2 Sept. 1841, that only 100 houses and a church were left standing. It had already been superseded both as a capital and a seat of commerce by San José. The railroad from San José to Limon passes through it. Near the town are the springs of Aguacaliente, and also Mount Cartago or Irazu, an active volcano, rising 11,480 feet above the sea-level. Pop. about 3,500.

Carte, Thomas, English historian: b. Clifton-upon-Dunsmoor, Warwickshire, April 1686; d. near Abingdon, 2 April 1754. He was educated at University College, Oxford, and Cambridge. His first publication was entitled 'The Irish Massacre Set in a Clear Light, etc.,' in which he defended Charles I. from the common charge of secretly instigating the rebellion and massacre in Ireland in 1641. During the rebellion of 1715, a warrant was issued for his apprehension, which he eluded by concealment; and later when it was supposed that he was concerned in a conspiracy, and a reward of £1,000 was offered for his capture, he escaped to France. Here he collected material for an English edition of the 'History of Thuanus' (de Thou). At length Queen Caroline procured leave for his return to England. His important work, the 'Life of James, Duke of Ormonde,' was published in 1735–6, and gained him great reputation, especially with the Tory party. In 1744 he was arrested on a suspicion of being employed by the Pretender, but was discharged. He published three volumes of his 'History of England' between 1747 and 1752, the fourth, which brought down the history to 1654, not appearing until after his death. The character of this work is deservedly high for research. Hume and other historians have been indebted to it, but the prejudices of the author are everywhere conspicuous.

Carte-blanche, kärt-blänch, a blank sheet of paper to be filled up with such conditions as the person to whom it is given may think proper; hence absolute freedom of action.

Carte de Visite, kärt dė vē-zēt, literally a visiting card, a photographic likeness executed on a card somewhat larger than a visiting card, and usually inserted in a photographic album. Cartes de visite were introduced by Disdéri in 1854.

Cartel', an agreement for the delivery of prisoners or deserters; also, a written challenge to a duel. A cartel-ship is a ship commissioned in time of war to exchange prisoners; also to carry proposals between hostile powers.

Car'ter, Elizabeth, English poet and linguist: b. Deal, 16 Dec. 1717; d. London, 19 Feb. 1806. She was the daughter of Dr. Nicholas Carter, a clergyman of Kent, and was educated by her father, soon becoming mistress of Latin, Greek, French, and German; to which she afterward added Italian, Spanish, Portuguese, Hebrew, and Arabic. She was for 50 years the friend of Dr. Johnson. Several of her poetical attempts appeared in the 'Gentleman's Magazine' before she attained her 17th year, and these procured her much celebrity. In 1739 she translated the critique of Crousaz on 'Pope's Essay on Man,' and in the same year gave a translation of Algarotti's explanation of the Newtonian philosophy. She published a translation of 'Epictetus,' in 1758.

Carter, Franklin, American educator: b. Waterbury, Conn., 30 Sept. 1837. He was graduated at Williams College in 1862, was professor of Latin there in 1865–72, and of German at Yale in 1872–81, and became president of Williams College 1882, resigning in 1901. He wrote a 'Life of Mark Hopkins' and a translation of Goethe's 'Iphigenia in Tauris.'

Carter, Sir Frederic Bowker Terrington, Canadian jurist: b. Saint John's, Newfoundland, 12 Feb. 1819; d. Saint John's 28 Feb. 1900. He was called to the Newfoundland bar in 1842, served in the Newfoundland assembly from 1855 to 1878, and two years later became chief justice of Newfoundland. He was knighted in 1878.

Carter, George B., American politician: b. Honolulu, Hawaii, 1866; was educated at Phillips Andover College and Yale University. In 1891 he was appointed Hawaiian consul at Seattle, Wash. He returned to Honolulu in 1896 and became active in island politics. He was appointed governor of Hawaii by President Roosevelt in 1903.

Carter, Henry. See Leslie, Frank.

Carter, James Coolidge, American lawyer: b. Lancaster, Mass., 14 Oct. 1827. He was educated at Harvard, and was admitted to the bar in New York in 1853. He was counsel for the city of New York in the famous case of the people against William Tweed, and in 1875 was appointed a member of the commission to devise a system of municipal rule for the cities

of the State of New York. He has published: 'The Proposed Codification of Our Common Law' (1884); 'The Provinces of the Written and the Unwritten Law' (1889); 'The Ideal and Actual Law' (1890).

Carter, James Madison Gore, American author: b. Johnson County, Ill., 15 April 1843. He was educated at the State Normal University, St. John's College, and Northwestern University Medical School. He served in an Illinois regiment during the Civil War, being captured and taken to Libby Prison. Among his works are: 'Outlines of Medical Botany of the United States'; 'Catarrhal Diseases of the Respiratory Organs'; and 'Diseases of the Stomach'; and various monographs on medical topics.

Carter, Louise Leslie, American actress. Her stage career began 10 Nov. 1890, when she appeared in the 'Ugly Duckling' in New York. Her other roles have been the Quakeress in 'Miss Helyett'; Maryland Calvert in 'The Heart of Maryland'; Zaza in 'Zaza'; and Madame Du Barry in 'Du Barry.' She is considered one of the leading actresses of the day. See Strang, 'Famous Actresses.'

Carter, Samuel Powhatan, American naval and military officer: b. Elizabethtown, Tenn., 6 Aug. 1819; d. Washington, D. C., 26 May 1891. He became a midshipman in 1840, fought in the Mexican war in coast attack, and in 1856 took part in the capture of the Barrier forts, Canton, China. In 1861 he was detailed to go to Tennessee, where he started the Tennessee brigade. All through the Civil War he was of great service to the government, and for his gallantry was brevetted major-general of volunteers. In 1882 he was promoted rear-admiral on the retired list.

Carter, Thomas Henry, American politician: b. Scioto County, Ohio, 30 Oct. 1854. He was bred to farming, but later became a lawyer, removing to Montana in 1882. He was Montana's first representative in Congress (1891), United States senator from that State from 1895 to 1901, chairman of the National Republican Committee in 1892–6, and was appointed in 1900 United States commissioner to the St. Louis Exposition.

Carter, William H., American military officer and author: b. Nashville, Tenn. In 1868 he entered the United States Military Academy. Successively promoted, he became in 1898 lieutenant-colonel and assistant adjutant-general. He served on the frontier from 1873–97, receiving a medal of honor for distinguished bravery in action at Cibicu Creek, Arizona, in 1881. In 1897 he became connected with the War Department. He wrote: 'Horses, Saddles, and Bridles'; 'Historical Sketch 6th United States Cavalry'; and 'From Yorktown to Santiago.'

Carteret, Antoine Alfred Désiré, än-twän al-frā dā-zē-rā kär-tē-rā, Swiss statesman and fabulist: b. Geneva, 2 April 1813; d. there, 31 Jan. 1889. His political career was long and brilliant; and in literature he has made a name with pleasing 'Fables' (1873), frequently treating political subjects, and a novel, 'Two Friends' (1872), descriptive of Genevese customs.

Carteret, kär'tē rĕt, Sir **George,** English provincial proprietor: b. St. Ouen, Jersey, between 1609–17; d. 14 Jan. 1679. He had a distinguished career in the British navy, was an active supporter of the royalist cause, was made lieutenant-governor of the island of Jersey and vice-admiral. He manifested an interest in colonization and received a royal grant, "in perpetual inheritance," of certain lands in America "to be called New Jersey," the name being taken from the island of which he had been governor. In 1651 he surrendered to the commonwealth and served for a time in the French navy, returning to England at the restoration. He was made treasurer of the navy in 1661 and suspended in 1669 for mismanagement of funds. In 1664 he was made joint proprietor with Lord Berkeley of the province of New Jersey under a grant from the Duke of York, and in 1676, when the province was divided, East Jersey fell to his share. He was one of the first proprietors of Carolina.

Carteret, John, Earl Granville, British statesman: b. 22 April 1690; d. Bath, 2 Jan. 1763. He received his education at Westminster School and Christ Church College, Oxford. From Oxford he proceeded to London, plunged into the political and social excitements of the period, made the acquaintance of Swift, and in 1710 married Lady Frances Worsley. Entering the House of Lords on 25 May 1711, as second Baron Carteret, he espoused the side of the Whigs, then led by Stanhope and Sunderland, and in 1714 made his first speech in the House of Lords in support of the Protestant Succession. On the accession of George I. Carteret became a lord of the bedchamber. In 1719 he was appointed by Stanhope, ambassador extraordinary to Sweden, and succeeded in arranging two treaties of peace, the first between Sweden, Hanover, and Prussia, and the second between Denmark and Sweden. In 1721 he was appointed to one of the two foreign secretaryships, that for the "Southern Department" of Europe, and as such, attended, in 1723, the congress of Cambria, which attempted the settlement of differences between Germany and Spain, and accompanied George I. to Berlin. In 1724 Carteret was appointed lord-lieutenant of Ireland. Though he came into collision with Swift over the Drapier prosecution, the two ultimately became warm friends. Between 1730 and 1742 Carteret took the lead in the House of Lords of the party opposed to Sir Robert Walpole. When this opposition succeeded in overthrowing Walpole, Carteret became the real head of the administration, but was driven from power by the Pelhams in 1744. In the same year he became Earl Granville on the death of his mother, who had been created Countess Granville in her own right.

Carteret, Philip, English provincial governor: d. 1682. He was appointed governor of the province of New Jersey by the proprietors, Berkeley and George Carteret, and was given power to grant land to settlers. He reached New Jersey in 1665, bringing with him about 30 settlers, and settled at Elizabethtown. He avoided trouble with the Indians by adopting the wise policy of buying the land from them or requiring the colonists to do so. In 1672 he went to England for a time, but returned in 1674, and during his absence New Jersey was in the possession of the Dutch for a year, 1673–4. In 1676 when the division of the prov-

ince into East and West Jersey was completed, he became governor of East Jersey, holding the position till his death. Owing to conflicting claims of New Jersey and New York, he had frequent quarrels with Andros, who attempted to deprive him of his commission.

Carteret, Philip, English navigator: d. Southampton, England, 21 July 1796. He was in the expedition commanded by Wallis, in 1766, on a voyage of discovery to the South Seas. He discovered Queen Charlotte's Isles, and other isles, two of which he called Gower and Carteret. A description of his voyage was given by Hawkesworth in the introduction to his narrative of Capt. Cook's first voyage (1773).

Cartesian Diver, Devil, or **Bottle-Imp,** a contrivance to illustrate the effect of the compression or expansion of air in changing the specific gravity of bodies. It is a small glass figure, hollow, and sometimes provided with a hollow bulb on its head. This is to be partly filled with water, and placed in a tall vessel, nearly full of water, and having a piece of caoutchouc secured tightly over the top. On pressing the caoutchouc the air of the vessel will be compressed; this will compress that within the figure or bulb, so admitting more water by a small aperture, and causing the figure to sink. On removing the pressure the air in the figure or bulb will expand, forcing out some of the water, and causing it to rise.

Carte'sian Oval, the name, from their earliest student, Descartes, applied to a family of curves defined as the locus of a point whose distances from two fixed points bear a stated relation to each other. The ellipse is a familiar example, though it was known and studied long before it was grouped with the cartesians.

Carte'sianism, the system of philosophy taught by René Descartes (q.v.). At the age of 20, Descartes resolved as far as possible to eliminate from his mind all that he had ever learned from books or instructors, and to think out for himself the entire circle to knowledge. His first postulate was *Cogito, ergo sum* — "I think, therefore I exist." Inquiring next into ideas, which he defined as "all that is in our mind when we conceive a thing, in whatever way we conceive it," he regarded clearness and distinctness as the criterion of a true as distinguished from a false idea. Of all ideas in the human mind that of a God is the clearest, therefore there is a God. As in this clear conception of God infinite veracity is attributed to him, it is impossible that he could make our faculties deceive us in mathematical and metaphysical demonstrations; these sciences, therefore, are trustworthy. The actual existence of the external world is proved by the prior truth, the existence of God. Creation was and is a manifestation of the divine will. Descartes revolutionized mathematics, imparting to it a beneficial impulse. He did likewise to metaphysics. Among his immediate followers in the latter science were Geulincx, Malebranche, and Spinoza. A celebrated opponent was Gassendi. The method of Descartes was adopted by all the philosophers of the rationalistic school who flourished during the latter half of the 17th and the whole of the 18th centuries. In physics he discovered the law of the refraction of a ray of light through a diaphanous body, but his *a priori* method was not the proper instrument for physical investigation, and his researches in that department were comparative failures.

Car'thage (conjectural native name, the Phœnician *Kereth-hadeshoth,* new city, from which the Greek *Karchēdon,* and the Roman *Carthago* are supposed to have been derived), the most famous city of Africa in antiquity, capital of a rich and powerful commercial republic. It was situated on the north coast, not far from the modern Tunis. According to tradition, Dido, fleeing from Tyre, came to this country, where the inhabitants agreed to give her as much land as could be compassed by an ox-hide. Dido cut the hide into small thongs, with which she enclosed a large piece of land. Carthage was founded, according to Aristotle, 287 years later than Utica. Becker supposes it to have been a joint colony or factory, in the Anglo-Indian sense, of Tyre and Utica. The actual date of its foundation is much contested. The uncertainty is accounted for probably by the gradual growth of the city, as well as by the diversity of epochs reckoned from, and the different calendars, or modes of computing time, used by the different chroniclers. The date commonly given is 878 B.C. The history of Carthage is usually divided into three periods. The first is the epoch of its gradual rise; the second that of the struggles with other states occasioned by its extended power; the third that of its decline and fall. These epochs interlock each other, and it is only as a matter of convenience that we can interpose exact dividing dates between them. The first epoch has been extended as far as to 410 B.C.; the second limited to the period chiefly distinguished by wars with Greece, 401–265; the third is the period occupied with the Roman wars, and ending with the fall of Carthage.

Carthage appears early to have been independent of Tyre, if ever she owned any direct dependence on the mother city. There existed, however, a close relationship between them, due to affinity of race and religion. This appears from various incidents in their history, as when the Tyrians refused to follow Cambyses in a contemplated attack on Carthage, and when Alexander, having attacked Tyre, the women and children were sent to Carthage. Tyre also appears as an ally of Carthage in her second treaty with Rome; and an annual offering was sent from Carthage to Tyre for the Temple of Hercules, to the neglect of which in periods of prosperity, subsequent calamities were often attributed. There is no evidence that the government of Carthage was ever monarchical. She appears soon to have acquired an ascendency over the earlier Tyrian colonies, Utica, Tunis, Hippo, Leptis, and Hadrumetum. This was probably gained without any effort, as the result of her material prosperity. Placed amid foreign and often hostile tribes, the African colonies of Tyre might have slight jealousies and rivalries among themselves, but their relations must, on the whole, have been friendly and confidential, and in the earlier stages of their history at least they would naturally follow the lead of the strongest among them. The rise of Carthage, then, may be attributed to the superiority of her site for commercial purposes, and the enterprise of her inhabitants. Her relations with the

native populations, as is evident from her subsequent history, would always be those of a superior with inferior races. Some of them were directly subject to Carthage, others contributed to her strength by recruiting her armies, although frequently in hostility with her. She established colonies for commercial purposes along the whole northern coast of Africa, west of Cyrenaica, and these colonies enabled her to maintain and extend her influence over the native tribes. These colonies, together with most of the earlier Phœnician colonies subject to her, possessed little strength in themselves, and easily fell a prey to an invader; hence they were in the end a source of weakness, although it is not easy to see how her prosperity could have been attained without them. It is only after the north of Africa has thus been placed at her command that Carthage appears formally on the stage of history. One of her earliest recorded contests is that with Cyrene, when the boundary between the two states was fixed, to the advantage of Carthage, at the bottom of the Greater Syrtis, the Carthaginian envoys, according to the traditional story, consenting to be buried on the spot. The immediate wants of the city were provided for by the cultivation of the surrounding territory, which alone was directly dependent on her.

Commerce naturally led Carthage to conquest. The advantages, both for the promotion and protection of her trade, of possessing islands in the Mediterranean, led to her first enterprises. Expeditions to Sicily and Sardinia appear to have been undertaken before the middle of the 6th century. The war was carried on in the latter half of this century by Mago, and his sons Hasdrubal and Hamilcar. At the same time a war arose with the Africans on account of the refusal of the Carthaginians to continue the payment of a ground-rent for their city. In this the Carthaginians were unsuccessful, but at a subsequent period they achieved their object. Sardinia was their first conquest. They guarded it with the utmost jealousy. The Romans, by the first treaty 509 B.C., were allowed to touch at it; but this permission was withdrawn in the second. It was the entrepôt of their trade with Europe, and lessened their dependence on their own territory for corn. They founded its capital, Caralis, now Cagliari. They soon after occupied Corsica, where they united with the Tyrrhenians, its previous possessors, against the Greeks. Sicily was already occupied by Greek and Phœnician colonies. The latter, on the decline of Tyre, seem to have fallen under the dominion of Carthage, which gave her a footing on the island. The Greeks were still the more powerful party, and the Carthaginians occupied themselves in promoting dissensions among their cities. When the Greeks were occupied with the Persian invasion, they organized a great expedition to take possession of the island, in which they landed 300,000 men, contributed by all their dependencies. Among these Sardinians, Corsicans, and Ligurians, the latter from the gulfs of Lyons and Genoa, are enumerated. They were totally defeated by Gelon, tyrant of Syracuse, and their leader slain, in the battle of Himera, 480 B.C. The Balearic, and many smaller islands in the Mediterranean, had already been occupied by the Carthaginians. Spain had also been colonized by them with peaceable commercial settlements. No other great enterprise took place in the first period of her history.

The war with the Greeks in Sicily was renewed in 409. Hannibal, the son of Gisco, landed an army at Lilybæum, in the spring of that year, and reduced Selinus and Himera. In a subsequent expedition Agrigentum was subdued. A pestilence seconded the efforts of Dionysius and saved Syracuse, 396 B.C. A treaty put an end to the war in 392. The struggle between the Greeks and the Carthaginians continued with varying success throughout the remainder of this period. Its most remarkable event was the invasion of Africa by Agathocles, 310 B.C. Defeated in Sicily by the Carthaginians, to avert the total ruin of his affairs, he raised an army and passed over to Africa. The most extraordinary success awaited him, showing at once the weakness of the hold which Carthage had of her external possessions on the continent, and the danger she constantly encountered from factions and dissensions within the city itself. Agathocles was the precursor of Scipio. After the death of Agathocles the Carthaginians renewed their enterprise in Sicily, and had nearly completed its conquest when the Greeks called in the aid of Pyrrhus, who for a time arrested their progress 277–5 B.C. Notwithstanding numerous and disastrous defeats in their contests with the Greeks, the Carthaginians seemed, after the departure of Pyrrhus, to have the conquest of Sicily at length within their power. A dissension with the Mamertines, their former allies, called in the Romans, and with their invasion, 264 B.C., the third period of Carthaginian history begins.

The first Punic war, in which Rome and Carthage contended for the dominion of Sicily, was prolonged for 23 years, 264 to 241 B.C., and ended, through the exhaustion of the resources of Carthage, in her expulsion from the island. The second Punic war, conducted on the side of the Carthaginians by the genius of Hannibal, lasted 17 years, 218 to 201 B.C., and after just missing the overthrow of Rome, ended in the complete humiliation of Carthage. The policy of Rome, at the end of this war, in placing Carthage, disarmed, at the mercy of her African enemies, and raising her a powerful opponent in Masinissa, occasioned the third Punic war, in which Rome was the aggressor. It lasted only three years, but served to throw a halo of glory round the fall of the republic, in whose total ruin it ended. This war, begun 150 B.C., was ended 146 B.C., in the destruction of Carthage.

The repeated and not always unsuccessful struggles of Carthage with her African neighbors, in the very midst of her schemes of foreign conquest, indicate the marvelous tension to which a power inherently so weak was wrought in those great enterprises which virtually grasped at the supremacy of the world. In this matter the experience of Carthage was not unparalleled by that of Rome; but the great difference between them was that the former was surrounded by alien tribes, the latter by races kindred in language and manners, with whom, after conquest, she could easily unite. The invasion and conquest of Spain, begun by Hamilcar and carried on by Hasdrubal and Hannibal, and which led to the second Punic war, can only be mentioned in passing.

Carthage perished leaving no historians to tell her tale; hence many interesting circumstances in her history can never be known, and

what is preserved has the color of partial and often hostile authority. The constitution of Carthage has occupied much of the attention of scholars, but still remains in many points obscure. The name of king occurs in the Greek accounts of it, and the first Carthaginian general who is recorded to have invaded Sicily and Sardinia is called Malchus, the Phœnician for king, but the monarchical constitution, as commonly understood, never appears to have existed in it. The officers called kings by the Greeks were two in number, the heads of an oligarchical republic, commonly called suffetes, the original name being considered identical with the Hebrew *shofetim,* judges. These officers were always chosen from the principal families, and were elected annually. It is not known if they could be re-elected. There was a Senate of 300, and the citizens were divided into classes similar to the Roman tribes, curiæ, and gentes. There was a smaller body of 30 chosen from the Senate, sometimes another smaller council of 10. Various other officers are mentioned, but the particulars regarding them are often obscure, and sometimes contradictory. There seems to have been an appeal to the people in certain circumstances, but the power at first lay almost exclusively in the hands of the oligarchy. The constitution worked well during the early part of the history of Carthage, but in its later ages the state was divided by bitter factions, and liable to violent popular tumults. Both Hamilcar and Hannibal, in their most important enterprises, experienced the opposition of the aristocratic party, led by Hanno, the head of a rival family, who appears to have been for a long period a consistent advocate of alliance with Rome.

After the destruction of Carthage, her territory became the Roman province of Africa. A curse was pronounced upon the site of the city, and any attempt to rebuild it prohibited. The attempt was, however, made 24 years after her fall, by Caius Gracchus, one of the leading men of Rome. The same plan was entertained by Julius Cæsar, and it was accomplished by Augustus. The new city became the seat of the proconsul of Old Africa in place of Utica, and continued to flourish till the Vandal invasion. It became distinguished in the annals of the Christian Church. Cyprian was its bishop, and Tertullian is supposed to have been a native of it. It was taken and destroyed by the Arabs, under Hassan, in 647.

The religion of the ancient Carthaginians was essentially that of their Phœnician ancestors. They worshipped Moloch or Baal, to whom they offered human sacrifices; Hercules, the patron deity of Tyre and her colonies; Astarte, and other deities, which were identified with the heavenly bodies, but propitiated by cruel or lascivious rites. Their religion was considerably modified by their intercourse with the Greeks. After their defeat by Gelon he made it a condition of peace with them that they should abandon human sacrifices. Some of their deities were identified with those of the Greeks, and they adopted others of that people, and no doubt received also some of their ideas regarding them. See Arnold's and Mommsen's histories of Rome; R. B. Smith, 'Carthage and the Carthaginians'; A. Church, 'Carthage, or the Empire of Africa'; N. Davis, 'Carthage and Her Remains.'

Carthage, Mo., a city and county-seat of Jasper County, in the southwestern part of the State, situated on Spring River and on the St. Louis & S. F. and the Missouri Pac. R.R.'s, 300 miles southwest of St. Louis. It is the centre of an extensive lead region, and in addition to zinc mines and stone and lime works has flour mills, machine-shops, foundries, and various other manufactories. Carthage has a public library, parks, national banks, daily and weekly newspapers, good public schools, and is the seat of Carthage College. It is located in one of the most attractive regions of the southwest, and in recent years great public improvements have added to the handsome appearance of the city. The cultivation of gardens has been stimulated by premiums from a popular fund, and the beautifying of the city has been most remarkable. Carthage is a place of historic note on account of an engagement which occurred in the vicinity during the Civil War. Pop. (1900) 9,416. See CARTHAGE, BATTLE OF.

Carthage, Battle of. On 17 June 1861, Gen. Nathaniel Lyon, U. S. A., drove the Confederates from Booneville, Mo., and Claiborne F. Jackson, the disloyal governor of Missouri, ordered a concentration of the State troops, who adhered to him, in the southwestern part of the State, to unite with the Arkansas troops, under the command of Gen. Ben. McCulloch. Anticipating McCulloch's movement into Missouri, Lyon ordered Gen. T. W. Sweeny, with three Union regiments, a small detachment of regulars, and some artillery, from St. Louis to Springfield. These were pushed forward by rail to Rolla and thence by road, and 28 June Col. Franz Sigel, with the 3d Missouri, arrived at Sarcoxie, southwest of Springfield, and 15 miles southeast of Carthage, Jasper County, an important strategical point, where it was anticipated that Jackson and McCulloch would endeavor to unite forces. Here Sigel learned that Gen. Sterling Price, with about 800 Missourians, was near Neosho, 22 miles south, and that Jackson, with other State troops, was to the north, 15 or 20 miles beyond Lamar, marching south. He concluded to move first on Price to disperse him, and then turn north on Jackson, his object being to prevent a junction of the two forces, and to open communication with Lyon, who was marching south from Booneville; but when he started after Price, on the morning of the 29th, he heard that he had retreated to join McCulloch, upon which he turned his thoughts toward Jackson, but continued his march to Neosho, where he was joined a few days later by Col. Salomon, with the 5th (Union) Missouri. Capt. Conrad's company of the 3d was left to hold Neosho, and on the 4th of July Sigel, with the two regiments and two batteries, of four guns each, marched to Spring River, a short distance southeast of Carthage, where he heard that Jackson, with over 4,000 men, was but nine miles in his front in the direction of Lamar. On the morning of the 5th, with about 1,000 men and eight guns, he advanced slowly, his train three miles in the rear, driving back the enemy's mounted skirmishers, and about nine miles beyond Carthage came upon Jackson's troops in line of battle on elevated ground, four divisions under command of Gens. James S. Rains, John B. Clark, M. M. Parsons, and W. Y. Slack, numbering nearly 5,000 men, 1,200 of whom were unarmed. About

1,800 were mounted men, armed with shotguns, and judiciously posted on the flanks of the infantry. Jackson had eight guns. After some skirmishing Sigel, at 10 o'clock, brought up seven guns and opened fire, which was promptly returned, but not effectively, for, being in want of proper ammunition, the Confederate guns were charged with pieces of chain, iron spikes, broken iron, and round stones or pebbles. After a desultory artillery fire of three hours the Confederate horsemen advanced from both flanks and making a wide circuit, to avoid Sigel's artillery, began to close in on him and threaten his train, whereupon, disposing four guns in rear and two on either flank he fell back, greatly harassed at every step, until he reached Carthage, where he made a stand. But, as the enemy were still pressing hard on him, working on both flanks and threatening the road to Springfield, he again fell back, skirmishing all the way, some two or three miles beyond Carthage, where pursuit ended, and Sigel marched to Sarcoxie, and thence by way of Mount Vernon to Springfield, where Lyon joined him on the 13th. The Union loss was 13 killed and 31 wounded, to which must be added the loss of Conrad's company of 94 men surprised and captured at Neosho, on the 5th, by Churchill's Arkansas regiment of McCulloch's command. The Confederate loss was about 30 killed and 125 wounded. The day after the engagement Jackson marched from Carthage and met McCulloch and Price coming to join him. Consult: Official Records, Vol. III.; the Century Company, 'Battles and Leaders of the Civil War,' (Vol. I.). E. A. CARMAN.

Carthage College, Carthage, Ill., a coeducational institution organized in 1870 under the auspices of the Lutheran Church. At the end of 1902 it reported: professors and instructors, 14; students, 250; volumes in the library, 5,000; grounds and buildings valued at $100,000.

Carthage'na. See CARTAGENA.

Car'thamin, or **Car'thamine,** the coloring-matter of safflower (*Carthamus tinctorius*), from which it is extracted by the action of sodium carbonate, which is subsequently neutralized by the addition of acetic acid. The carthamin is removed from the solution by the addition of cotton cloth, to the fibres of which it adheres strongly, coloring them a fine red when the solution from which it is deposited is acid, and yellow when it is alkaline. The carthamin may be removed from the cotton by the action of sodium carbonate, and may then be precipitated in a comparatively pure state by the addition of citric acid. When thus prepared, carthamin is a powder, red or golden green in color, very slightly soluble in water or ether, but dissolving readily in alcohol, with the formation of a purple solution. Mixed with French chalk it is used as a rouge. It has the chemical formula $C_{14}H_{16}O_7$.

Carthu'sians, an order of monks in the Roman Catholic Church, founded in 1084 by Bruno (St. Bruno), a priest of the diocese of Rheims and principal of the theological school there. What specially prompted Bruno to retire from the world was the openly confessed contempt of his bishop for piety and religion. It was a saying of this bishop that while it was a fine thing to be archbishop of Rheims, it was too bad that he had to sing masses. Bruno, with a little band of his friends, who were of the same mind with him, sought solitude in the diocese of Grenoble, and settled in a wilderness near that city called the *Cartusium.* It was a region of terrible aspect, with naked and precipitous rocks surrounded by sterile hills; and the poet Gray, in the five Latin Alcaic stanzas which in 1741 he wrote in the album of the monastery of Cartusium or La Grande Chartreuse, notes the austere features of the locality in terms which recall the picture drawn of it by Bruno's contemporaries, the *invias rupes,* the *fera juga,* the *clivos præruptos,* the *nemorum noctem* (impassable cliffs, rugged mountains, precipitous heights, gloomy forests). His institute was the most rigorous of all the monastic orders, and the Carthusians might boast — were they given to boasting — that theirs is the only monastic order that never has had to undergo reformation to bring it back to its first rigor. Bruno gave his community a rule of life which was not committed to writing: it prescribed perpetual silence, abstinence from flesh-meats, habitual wearing of the cilicium or horsehair shirt, and the like austerities. But he retained withal his love of letters, and communicated to his brethren a taste for science and learning. Besides the customary religious exercises of all monastic institutes, his monks were required to occupy a part of the time in manual labor and the other part in the work of transcribing the ancient authors and the more important public documents and records of the time. Before long there was founded in the wilderness of the *Cartusium* a collateral branch for women recluses, under substantially the same rule.

A written rule was given to the Carthusians by Guigo, fifth prior of the Cartusium — the head of a Carthusian institute is always prior, not abbot — in 1129. It forbids the practice of austerities not prescribed by the founder and establishes in perpetuity the provisions of Bruno's rule. Guigo wrote a 'Manual for Monks' in which he names reading, meditation, prayer, and contemplation as the means of reaching the perfection of the Christian and religious life. The original establishment, the Cartusium, or La Grande Chartreuse, contributed to the mother house of the order continuously, the troublous time of the Revolution excepted, down to the year 1903, when under the law for regulation or suppression of monastic houses in France, the religious community was dispossessed and turned out of the home in which it had lived during more than 800 years. The latest rule of the order of Carthusians dates from 1581. In many respects it is not as rigorous as the rule given by Bruno and Guigo. The use of linen is still forbidden, the abstinence from flesh-meats is still enforced, as is also the rule of silence. The Carthusian "house" is still an assembly of detached small houses or cells comprised within an enclosure, with a patch of ground around each little house. The general of the Carthusians resides — rather till the expulsion of the inmates did reside — at La Grande Chartreuse, not at Rome, as do the generals of most of the religious orders.

Cartier, SIR **George Etienne,** Canadian statesman: b. St. Antoine, Verchères County, Quebec, 6 Sept. 1814; d. London, 21 May 1873. Educated at the College of St. Sulpice, Montreal,

he was admitted to the bar in 1835, took part in the rebellion of 1837, and in consequence had for a time to leave Canada. In 1848 he entered the Canadian Parliament as representative of his native county, and in 1856 became provincial secretary. Later in the same year he became attorney-general for Lower Canada, in which post he was active in behalf of legal reforms. In 1857 he was a member of the Macdonald ministry, and in 1858 became premier, remaining in this position, except for a few days, till 1862. In 1864 he declined the premiership, but accepted the office of attorney-general. He was active in bringing about the establishment of the Dominion of Canada in 1867, and held the office of minister of defense in the first Dominion cabinet. In 1868 he was created a baronet.

Cartier, Jacques, French navigator: b. St. Malo, 31 Dec. 1491; d. 1557. After gaining some experience in fishing-fleets off the Labrador coast, he commanded an expedition to North America in 1534, entering the Strait of Belle Isle, and took possession of the mainland of Canada in the name of Francis I. The next year he sailed up the St. Lawrence as far as the present Montreal. In 1541 he went out as captain-general in command of a first detachment of ships to prepare the way for Roberval, who had been named viceroy. Finding, however, that his chief did not arrive, after he had waited some time, he returned to St. Malo. The natives usually received him well, but when about to return from his second voyage he treacherously kidnapped Donnaconna, one of the chiefs, and some others, in order to show them in his native country. His book, 'Discours du Voyage fait par le Capitaine Jacques Cartier aux Terres neufves de Canada,' was published in 1598.

Cartilage, one of the primary tissues of animal structures, of the connective-tissue class, characterized by its peculiar basement substance. The most abundant form of cartilage is the hyaline variety, but there are also fibrous and fibro-elastic cartilages. Hyaline cartilage, particularly abundant on the ends of the bones, is whitish and translucent, firm and elastic. The cells are imbedded in an abundant homogeneous basement substance which is made up largely of chondrin. Fibrous cartilage is less abundant, and its basement substance is fibrillated. It is found about the intervertebral cartilage masses, about the joints, and around the tendons of some of the larger muscles. The fibro-elastic form is found only in certain structures,—the epiglottis, the larynx, the Eustachian tube, and in the external ear. Cartilage tissues protect the ends of the long bones by reason of their firm elasticity. They provide strong, firm, and yet movable structures where bone, by reason of its rigidity, would not be serviceable, as in the epiglottis, larynx, etc.

Carton, Florent. See DANCOURT.

Carton, Sydney, the hero in Dickens' 'Tale of Two Cities.'

Cartoon (It. *cartone,* from Lat. *charta,* paper), a term having various significations. In painting, it denotes a sketch on thick paper, pasteboard, or other material, used as a model for a large picture, especially in fresco, oil, tapestry, and sometimes in glass and mosaic. In fresco painting, cartoons are particularly useful, because in this a quick process is necessary, and a fault cannot easily be corrected. In applying cartoons, the artist commonly traces them through, covering the back of the design with black-lead or red chalk; then, laying the picture on the wall or other matter, he passes lightly over each stroke of the design with a point, which leaves an impression of the color on the plate or wall; or the outlines of the figures are pricked with a needle, and then, the cartoon being placed against the wall, a bag of coal-dust is drawn over the holes, in order to transfer the outlines to the wall. In fresco painting, the figures were formerly cut out and fixed firmly on the moist plaster. The painter then traced their contour with a pencil of wood or iron, so that the outlines of the figures appeared on the fresh plaster, with a slight but distinct impression, when the cartoon was taken away. In the manufacture of a certain kind of tapestry the figures are still cut out, and laid behind or under the woof, by which the artist directs his operations. In this case the cartoons must be colored. In very modern times the term is commonly applied to pictures caricaturing notable characters or events of the moment. See CARICATURE AND CARICATURISTS.

The most famous cartoons in existence are those executed by Raphael for the celebrated tapestries of the Vatican, which were made at Arras, and hence called Arazzi. Two sets of these tapestries were ordered by Leo. X., one for the Vatican and the other for presentation to King Henry VIII. The second set, or fragments of it, are still in existence on the Continent. The cartoons lay for a time neglected at Arras, and have repeatedly fallen into neglect again, so that out of 25, the original number, only seven remain, and these have had to be restored. They were purchased at the advice of Rubens by Charles I. about 1630. On the sale of his effects they were purchased by the order of Cromwell for the nation, but again fell into neglect in the time of Charles II. William III. had them restored, and built a gallery for them at Hampton Court, where they remained, until in 1865 they were lent to the South Kensington Museum. The subjects of the seven are: (1) Paul Preaching at Athens; (2) The Death of Ananias; (3) Elymas the Sorcerer Struck with Blindness; (4) Christ's Charge to Peter; (5) The Sacrifice at Lystra; (6) Peter and John Healing the Cripple at the Beautiful Gate of the Temple; (7) The Miraculous Draught of Fishes. The cartoons have been repeatedly engraved, among others by Dorigny, Holloway, and Gribelin. They have also been extensively made known by photographs.

The cartoon of the School of Athens, carried to Paris by the French, and a fragment of the Battle of Maxentius and Constantine, are preserved in the Ambrosian Gallery at Milan. There are, likewise, cartoons by Giulio Romano in the Sala Borgia, by Domenichino and other Italian masters, who caused their pictures to be executed, in a great degree, by their scholars, after these cartoons. The value set upon cartoons by the old Italian masters may be seen by Giovanni Armenini's 'Precetti dello Pittura' (1687). In later times large paintings, particularly in fresco, were not executed so frequently. The artists also labored with less care, and formed their great works more from small sketches. In modern times some German artists have prepared accurate cartoons. Among them is Cornelius,

whose cartoons for his fresco paintings in Munich have acquired much celebrity. He prepared, too, a cartoon for the fresco picture representing 'Joseph Interpreting the Dream.' Overbeck and Julius Schnorr may also be mentioned for their cartoons.

Cartouche, Louis Dominique, loo-ē dŏm-ĭ-nēk kär-toosh, French robber: b. Paris, about 1693; d. Châtelet, France, 28 Nov. 1721. He was the leader of a noted company of robbers, and being captured was broken alive on the wheel in 1721. His life has formed the subject of a modern French drama, and was formerly represented on the English stage.

Cartouche, or **Cartouch** (French *cartouche*). (1) A wooden case about three inches thick at bottom, and girt round with marline, holding 200, 300, or 400 musket-balls, with 8 or 10 iron balls weighing one pound each, to be fired from a mortar, gun, or howitzer for the defense of a pass, retrenchment, etc. Such missiles have been superseded. In French military language cartouche signifies the entire charge of a firearm. (2) In architecture, sculpture, etc., an ornament representing a scroll of paper, being usually in the form of a table, or flat member, with wavings, whereon is some inscription or device. (3) The name given by the French literati to that oval ring or border which includes, in the Egyptian hieroglyphics, the names of persons of high distinction. (4) In heraldry a name given to a sort of oval shield, much used by the Popes and secular princes in Italy, and others, both clergy and laity, for painting or engraving their arms on.

Cartridge, a case of paper, parchment, metal, or flannel suited to the bore of firearms, and holding the exact charge, including, in the case of small arms, both powder and bullet (or shot). In loading with the old style of cartridge for muzzle-loading rifles, the paper over the powder was bitten or twisted off and the powder poured in, the bullet being then inserted and rammed home. The cartridges used for breech-loading rifles contain the powder in a case of solid brass, and have the percussion-cap by which they are ignited fixed in the base. Such cases can be refilled and used a number of times in succession. Cartridges for shot-guns are similar to those for rifles, but are usually of less solid construction, being commonly of strong paper with a base of metal. Those for large guns are usually made of flannel and contain only the powder. Blank-cartridge is a cartridge without ball or shot. Cartridges for blasting are filled with dynamite or other explosive.

Cartridge-paper, a thick paper originally made for the manufacture of cartridges, but extensively used in the arts, its rough surface giving it an advantage for drawing upon, as a wall paper, and for other purposes.

Cartwright, Edmund, English inventor: b. Marnham, Nottinghamshire, 24 April 1743; d. Hastings, Sussex, 30 Oct. 1823. He was educated at University College, Oxford, and having taken orders in the Church, obtained first the living of Brampton, near Chesterfield, and afterward that of Goadby-Marwood, in Leicestershire. It was, however, only after he had reached 40 years of age that his attention was first turned to the subject on which his claim to remembrance is founded. In the summer of 1784 he began to investigate the subject of mechanical weaving, and experiment regarding improvements. His efforts were crowned with success, and in April of the following year he brought his first power-loom into action. It was not, in fact, in respect of economy of labor, any advance upon the ordinary hand-loom; but the idea which subsequent improvements have carried so far in advance of hand-loom weaving was there. The introduction of Cartwright's loom was opposed both by manufacturers and workmen; and the first mill erected for them, containing 500 looms, was burned down. His attention once turned in the direction of mechanical improvement, he continued to make progress in discovery. He not only perfected his power-loom, but took out 10 patents for different inventions, among which was one for combing wool. He expended much of his means in these investigations, and in 1809 he received as an acknowledgment of their value a grant from Parliament of £10,000, which relieved him from straitened circumstances, although, it is said, it did not cover his expenditure. He also received premiums for various improvements from the Society of Arts and the board of agriculture.

Cartwright, John, English reformer, brother of Edmund Cartwright (q.v.): b. Marnham, Nottinghamshire, 17 Sept. 1740; d. London, 23 Sept. 1824. He entered the navy in 1758, and became a first lieutenant in 1766. In 1774 his attention was turned to politics. In his 'Letters on American Independence' (Independence of America considered as supremely useful and glorious to Great Britain), written in this year, he advocated a union between the colonies and the mother state, under separate legislatures, and argued this great question on the foundation of natural, inherent right; maintaining "that the liberty of man is not derived from charters, but from God, and that it is original in every one." In 1775 he was appointed major of the Nottinghamshire militia, and after several ineffectual attempts on the part of government to remove him from that post, his dismission was finally accomplished in 1792, in consequence of an act of Parliament. In the American war Lord Howe was desirous of having him with him in America; but Major Cartwright, although always eager for promotion in the navy, refused the proposal, alleging that he could not fight in a cause which he disapproved. From this time he devoted himself to the favorite objects of annual parliaments and universal suffrage. He was the author of a Declaration of Rights, distributed by the Society for Constitutional Information. The French revolution was warmly welcomed by Cartwright. In the trials of Tooke, Hardy, Thelwall, and other reformers, Cartwright was present as a witness, and displayed much firmness and fearlessness. By his writings, public addresses, etc., he continued to promote the work of reform and constitutional liberty; and as late as 1820 was tried for conspiracy and sedition, for advising the inhabitants of Birmingham, which had then no parliamentary representative, to send what he called their "legislatorial attorney" to the house; but he escaped with a fine of £100. Major Cartwright was not a political reformer only. The plan of making the slave-trade piracy is said to have been first developed in his 'Letters on the Slave-Trade.' A statue has been erected in London to his memory.

Cartwright, Peter, American Methodist clergyman: b. Virginia, 1 Sept. 1785; d. near Pleasant Plains, Ill., 25 Sept. 1872. He was ordained in Kentucky in 1806, and in 1823 removed to Illinois, where he labored for nearly half a century. He also sat in the State legislature there, and in 1846 was defeated by Abraham Lincoln in an election for congressman. Admired for his eloquence and strong common sense, he was also loved for his quaint eccentricity of manner, and possessed great influence in his own denomination.

Cartwright, Sir **Richard John,** Canadian statesman: b. Kingston, Ont., 4 Dec. 1835. He was educated at Trinity College, Dublin, and entered Canadian politics as a Conservative, but on account of a disagreement with Sir John A. Macdonald joined the Liberal party. He has served in the Canadian Parliament almost continually since 1863. He was minister of finance from 1873 until 1878, when his opposition to the policy of protection caused his downfall. He is an able speaker and an authority on finance. In 1897 he was a member of a Canadian commercial commission to the United States. He was knighted in 1879.

Cartwright, Thomas, English Puritan divine: b. Hertfordshire, 1535; d. Warwick, 27 Dec. 1603. He suffered imprisonment and exile more than once for his nonconformist opinions. He was a learned man, and at one time professor of divinity at Cambridge. His chief books are: 'A Second Admonition to the Parliament' (the first one having been published in 1572); 'A Confutation of the Rhemist's Translation'; 'Harmonia Evangelica'; and a criticism of Hooker's 'Ecclesiastical Polity.'

Carucate, kăr'ū kāt, in mediæval times, as much land as one team could plow in the year. The size varied according to the nature of the soil and practice of husbandry in different districts.

Carupano, kä-roo'pä-nō, Venezuela, a seaport of the State of Bermudez, on the north coast of the peninsula of Paria, with a lighthouse and good roadstead. The surrounding district is fertile, and has mines of copper, sulphur, silver, lead, and lignite. The city exports cocoa, coffee, fish, etc., and has various manufactures. Pop. about 10,000.

Carus, kä-rūs, **Julius Victor,** German zoologist: b. Leipsic, 25 Aug. 1823. After studying at Leipsic, Würzburg, and Freiburg, he became at the age of 26 keeper of the Oxford museum of comparative anatomy. In 1853, two years after his return to his native city, he was appointed professor of comparative anatomy and director of the Zoological Institute there. Among his numerous writings are: 'System der Tierischen Morphologie' (1853); 'Handbuch der Zoologie'; and 'Geschichte der Zoologie.' He has translated most of Darwin's works into German.

Carus, Karl Gustav, goo'stăf, German physician and physiologist: b. Leipsic, 3 Jan. 1789; d. Dresden, 28 July 1869. He became professor of midwifery at the Medical Academy, and then royal physician, being subsequently a privy-councilor. He published a great number of writings covering a wide field of science, including medicine, physiology, anatomy, psychology, physics, painting, besides memoirs of his life. Among these are 'System der Physiologie' (1838–40); 'Lebenserinnerungen und Denkwürdigkeiten' (1865–6); 'Lehrbuch der Zootomie' (1818); 'Über den Blutkreislauf der Insekten' (1827); 'Psyche' (1851).

Carus, kăr'ŭs, **Marcus Aurelius,** Roman emperor: b. Nerona, Dalmatia, about 222 A.D.; d. near Ctesiphon, Mesopotamia, 283. His father was an African, and his mother a noble Roman lady. He was proclaimed emperor by the legions, on the assassination of Probus, 282. He caused justice to be executed upon the assassins. He gained a signal victory over the Sarmatians, and prosecuted the war against the Persians. Undertaking the campaign in midwinter, and making a rapid march through Thrace and Asia Minor, he ravaged Mesopotamia, made himself master of Seleucia, and carried his arms beyond the Tigris.

Carus, Paul, American philosophical writer: b. Ilsenburg, Germany, 18 July 1852. He was educated in the universities of Strassburg and Tübingen, and has been a resident of Chicago for several years, where he is editor of 'The Open Court' and 'The Monist.' He has published: 'The Ethical Problem'; 'Fundamental Problems'; 'The Soul of Man'; 'Primer of Philosophy'; 'Truth in Fiction'; 'Monism and Meliorism'; 'The Religion of Science'; 'The Philosophy of the Tool'; 'Our Need of Philosophy'; 'Science: a Religious Revelation'; 'The Gospel of Buddha'; 'Kanna'; 'Nirvana'; 'Homilies of Science'; 'Chinese Philosophy'; 'The Idea of a God'; 'Buddhism and Its Christian Critics'; 'The Dawn of a New Era'; 'Kant and Spencer'; 'The Nature of the State'; 'The History of the Devil'; 'Whence and Whither'; 'Eros and Psyche.'

Carus-Wilson, Charles Ashley, Canadian scientist: b. Eastry, England. He was graduated at Cambridge (1887) and became a civil engineer. Since 1890 he has been professor of engineering science at McGill University. He has written 'Electro-Dynamics,' and many monographs on his science.

Carutti di Cantogno, Domenico, dō-mā'nē-kō kä-rŭt'tē dē kän-tōn'yō, Baron, Italian historian and publicist: b. Cumiana, near Turin, 26 Nov. 1821. As a young man he took to romance writing, but was speedily absorbed in politics and rose to great distinction. When he resumed the pen, it was to compile such solid works as 'History of the Reign of Victor Amadeus II.' (1856) and 'History of the Reign of Charles Emanuel III.' (1859), which are interesting and scholarly.

Carvajal, kär-vä-häl', **Gas'par de,** Spanish missionary: b. Spain, early in the 16th century; d. Lima, Peru, 1584. He entered the Dominican order and went to Peru in 1533. In 1538 he accompanied the expedition of Gonzalo Pizarro to the countries east of the Quito as chaplain. He was appointed sub-prior of the convent of San Rosario at Lima; after the pacification of Peru he was sent to the mission of Tucuman and after working among the Indians there was made vicar-national of the province of Tucuman. With the aid of the Dominicans, whom he brought into the country, he established several Indian towns and Spanish colonies.

Carvajal, Tomas José Gonzales, tō'mä hō'sā gōn thä'lēs, Spanish statesman and author: b. Seville, 21 Dec. 1753; d. 9 Nov. 1834. He was appointed in 1795 governor of the new colonies in Sierra Morena and Andalusia, and protested against the French invasion of Spain in 1808. From 1809 to 1811 he served as commissary in the Spanish army against Bonaparte; in 1813 became minister of finance; relinquished these offices to assume the directorship of the royal university of Isidro, where he became involved in difficulties by establishing a professorship of constitutional law. He was arrested and detained in prison from 1815 to 1820, when the revolution reinstated him at San Isidro. A counter revolution brought his opponents into power, and he was exiled from 1823 to 1827. However, at the time of his death he was member of the supreme council of war, of the military department of the Spanish and Indian boards, and a grandee of Spain. He learned Hebrew at the age of 57 in order to translate the Psalms. This translation has gained for him a high reputation for poetical power.

Carvalho, José da Silva, hō'sā dā sēl vä kär-väl'yō, Portuguese statesman: b. Beira 1782; d. 3 Feb. 1845. He was a member of the regency and appointed minister of justice until 1823, when, on the downfall of the constitutional government, of which he was a foremost champion, he was obliged to resort to flight to England, where he remained until 1826, when he returned to Lisbon, but Don Miguel's success again compelled him to leave. Eventually he was named a member of the council of guardianship instituted by Don Pedro for the young queen, Donna Maria, and succeeded in negotiating the first English loan for Portugal. Having accompanied Don Pedro to the Azores, he filled, on his return to Portugal, important offices, and became finance minister in 1832. In 1835 he retired with the Palmella administration, and was presently obliged to retire to England, where he remained until 1838, when a general amnesty was proclaimed.

Carvalho, Paez de Andrade, Manuel de, pä-ĕth' dā än-drä'dā mä'noo-ĕl dā kär-väl'yō Brazilian politician: b. about 1795; d. Rio de Janeiro, 18 June 1855. Elected temporary president of Pernambuco in December 1823, he led a revolt the next year against Pedro I., the emperor, and on 2 July 1824, announced a republic entitled 'Confederacao do Equador.' On the suppression of the revolt in October, Carvalho fled to England, but subsequently returned to Brazil and was a senator from 1835.

Carvel-built, a term applied to a ship or boat, the planks of which are all flush and not overlapping, as in clinker-built boats.

Car'ver, John, first governor of the Plymouth colony: b. England, about 1575; d. Plymouth, Mass, April 1621. He joined the Leyden colony of English exiles about 1608, and as their agent assisted in securing a charter from the Virginia Company and in selecting and equipping the Mayflower. He was elected governor, probably 11 Nov. 1620, after the Mayflower reached Provincetown, showed great ability and judgment in governing the infant colony after the landing at Plymouth, and established by a treaty with the Indians peaceful relations that remained for many years undisturbed. He was re-elected in March 1621, but died a few days afterward. His chair and sword are still preserved as Pilgrim relics.

Carver, Jonathan, American traveler: b. Stillwater, N. Y. (the universal ascription to Connecticut is an error), 1732; d. London, 1780. He embraced a military career, and in the French war of 1756 commanded a company of provincials, in the expedition across the lakes against Canada. When peace was concluded in 1763, Carver undertook to explore the vast territory which Great Britain had gained. His object was to acquire a knowledge of the manners, customs, languages, soil, and natural productions of the nations and region beyond the Mississippi, and to ascertain the breadth of the continent by penetrating to the Pacific over its widest part, between lat. 43° and 46° N. He accordingly set out from Boston in 1766, and having reached Michilimackinac, the remotest English post, applied to Mr. Rogers, the governor, for an assortment of goods as presents for the Indians dwelling in the parts through which his course was to be directed. Receiving a portion of the supply which he desired, and a promise that the residue should be sent to him at the Falls of St. Anthony, he continued his journey. But not obtaining the goods at the appointed place, in consequence of their having been disposed of elsewhere by those to whom the governor had intrusted them, he found it necessary to return to La Prairie du Chien. He then, in the beginning of the year 1767, directed his steps northward, with a view of finding a communication from the heads of the Mississippi into Lake Superior, in order to meet, at the grand portage on the northwest side of that lake, the traders that usually came about this season from Michilimackinac, from whom he intended to purchase goods, and then to pursue his journey. He reached Lake Superior in good time; but unfortunately the traders whom he met there could not furnish him with any goods, as they had barely enough for their own purposes, and, in consequence, he was obliged to return to the place whence he first departed, which he did in October 1768, after remaining some months on the north and east borders of Lake Superior, and exploring the bays and rivers that empty themselves into that body of water. He soon after repaired to England with the view of publishing his journal and charts, and of obtaining reimbursement for the expenses which he had incurred. Having undergone a long examination before the lords commissioners of trade and plantations, he received permission to publish his papers; but when they were nearly ready for the press an order was issued from the council-board, requiring him to deliver immediately into the plantation office all his charts and journals. He was, consequently, obliged to repurchase them at a great expense from the bookseller to whom he had disposed of them — a loss for which he received no indemnification, but was forced to be satisfied with that obtained for his other expenses. He had fortunately kept copies of his papers, and he published them 10 years afterward in Boston, while in the situation of a clerk of a lottery. He died in want of the common necessaries of life in 1780, aged 48 years. His works are: 'Travels Through the Interior Parts of North America' (1778); 'Treatise on the Culture of the Tobacco Plant' (1779).

Carving, as a branch of sculpture, the art of cutting a hard material by means of a sharp instrument: but there are extended uses of the term, as shown below.

The term is generally employed for work which is strictly decorative as distinguished from grand sculpture; thus the wrought stone leafage, scroll work and even animal forms in a Gothic porch are *carving* in common parlance, and so are the human figures of the porch if they are conventional or stiff, as often happens in mediæval work. In a Roman temple or a neo-classic edifice the leafage of Corinthian capitals or of any panel or string-course would be called *carving,* while the statues and even the reliefs of human subjects would be spoken of as sculpture (q.v.). Small pieces, even of human subjects, such as decorative statuettes and groups, are spoken of as carving, and these may be wrought in wood, ivory, bone, marble, and other stones, and even in hard and semi-precious stones, such as agate and jade. The carvings of the Chinese and Japanese are especially in demand in western lands, because of their picturesque beauty. When they are of wood they are often painted, gilded or lacquered with a rich polychromatic effect.

Throughout the middle ages of Europe, ivory statuettes, backs of mirrors, and purely ornamental objects were treated in the same way, the carving being helped out by color and gold with extraordinary results.

Carving, when done in very hard material, such as rock crystal and jade, requires much use of the drill, in which case the meaning of the term must be extended to include the result produced by a rapidly revolving pin with emery powder or the like. One of the most ingenious and useful purposes to which carving has been converted in more modern times is that of engraving wood-cuts or blocks for printing. (See WOOD-ENGRAVING.) Carving has been applied to almost innumerable uses in manufactures as well as in art. Some of these applications have given way to the art of engraving in metal and other processes, but new ones are continually arising. The first carving-machine was invented about 1800, and many others have since been patented.

Cary, Alice, American poet: b. near Cincinnati, Ohio, 26 April 1820; d. New York, 12 Feb. 1871. When quite young she began writing sketches and poems for the press, and in 1852 she, with her sister, Phœbe (q.v.), removed to New York, where they lived during the rest of their lives. In 1850 the sisters published a volume entitled 'Poems by Alice and Phœbe Cary.' Alice soon after published 'Clovernook, or Recollections of Our Neighborhood in the West' (1851–3); 'Lyra, and Other Poems' (1853); 'Hagar, a Story of To-day' (1852); 'Married, not Mated,' a novel (1856); 'Lyrics and Hymns'; 'The Bishop's Son'; 'The Lover's Diary' (1867); and 'Snow Berries: A Book for Young Folks' (1869). The verse of the Cary sisters still retains a hold upon the affections of readers and not a few lines of theirs have become familiarized by frequent quotation. While living in New York they attracted about them a circle of literary people, and for 15 years their Sunday evening receptions were a feature in the literary life of the city.

Cary, Annie Louise, American singer: b. Wayne, Maine, 22 Oct. 1842. She studied in Milan, made her operatic début in Copenhagen in 1868, had a successful European career for three years, and returned in 1870 to the United States, where she won great popularity and remained, with the exception of one brilliant European tour, until 1882, when she married Charles M. Raymond, and retired from the stage while her voice was still unimpaired. Since then she has sung only in private or for charity.

Cary, Archibald, American statesman: b. Virginia, about 1730; d. Chesterfield, Va., September 1786. He early became a member of the House of Burgesses, and in 1764 served on the committee which reported the address to the king, lords, and commons, on the principles of taxation; and in 1770 was one of the signers of the "Mercantile Association," which pledged its members to use no British fabrics thereafter, the design being to resist by practical measures the encroachments of the government. In 1773 he was one of the celebrated committee of correspondence by which the colonies were united into one great league against Parliament. When the State government was organized he was returned to the Senate, where he presided with great dignity and efficiency. At this time occurred the incident with which his name is most generally connected. The scheme of a dictatorship had been broached, and without his knowledge or consent Patrick Henry was spoken of for the post. In the midst of the general agitation Cary met Henry's half-brother in the lobby of the assembly, and said to him: "Sir, I am told that your brother wishes to be dictator. Tell him from me, that the day of his appointment shall be the day of his death, for he shall find my dagger in his heart before the sunset of that day." The project was speedily abandoned. He was a good representative of the former race of Virginia planters, delighting in agricultural pursuits, in blooded horses, and improved breeds of cattle, which he imported from England, and attended to with great care.

Cary, Edward, American journalist: b. Albany, N. Y., 5 June 1840. He has long been connected with the editorial staff of the New York *Times.* His principal published work is a 'Life of George William Curtis' (1894).

Ca'ry, Elisabeth Luther, American writer: b. Brooklyn, N. Y., 1867. She is a daughter of Edward Cary (q.v.), and has published translations from the French of 'Sarcey and Melchior Vogue.' Her own works include 'Alfred Tennyson: His Homes, His Friends, and His Work' (1898); 'Robert Browning; Poet and Man' (1899); 'The Rossettis: Dante, Gabriel, and Christina' (1900).

Cary, George Lowell, American Unitarian theologian: b. Medway, Mass., 10 May 1830. He was graduated at Harvard College in 1852; and was a professor at Antioch College, 1856–62. Since 1862 he has been professor of New Testament literature in Meadville Theological Seminary, Pennsylvania, of which he is also president. He has published 'Introduction to the Greek of the New Testament' (1878); 'The Synoptic Gospels' (1900).

Cary, Henry Francis, English translator of Dante: b. Gibraltar, Spain, 6 Dec. 1772; d. London, 14 Aug. 1844. In 1790 he entered Christ Church, Oxford, and he took orders in

1796. In 1796 he was presented to the vicarage of Abbot's Bromley, Staffordshire, and in 1800 he removed to Kingsbury, in Warwickshire, another living to which he had been presented. His studies while at college had embraced a wide range of Italian, French, and English literature, and in 1805 he gave proof of his Italian scholarship, as well as of his poetic powers, by the publication of the 'Inferno' of Dante in English blank-verse, accompanied by the Italian text. The entire translation of the 'Divina Commedia' was accomplished in 1812, and the work was now published complete, but it lay unnoticed for several years, till Samuel Taylor Coleridge drew attention to its merits. It has since been recognized as a standard English work. Cary subsequently translated the 'Birds' of Aristophanes (1824), and the 'Odes' of Pindar, and wrote a continuation of Johnson's 'Lives of the English Poets,' and a series of 'Lives of Early French Poets.' He was for some time curate of the Savoy, London, and in 1826 was appointed assistant-keeper of printed books in the British Museum, which office he resigned in consequence of his being passed by on the appointment of Mr. Panizzi in 1837 to the office of keeper of the printed books. The government in 1841 granted him a pension of £200 a year as a recognition of his literary abilities, and he devoted himself henceforth to the annotation of a new edition of his translation of Dante, and to editing editions of the English poets Pope, Cowper, Milton, Young, etc. He was buried in Westminster Abbey.

Cary, Lott, American negro slave: b. Virginia, 1780; d. 1828. He educated himself, became a Baptist minister, purchased the freedom of himself and his two children for $850, and joined the colony sent in 1822 to Liberia, where he performed inestimable services in behalf of the new republic. He was acting as agent with full power when he was accidentally killed while making cartridges for defense against the slave traders.

Cary, Lucius. See FALKLAND.

Cary, Phœbe, American poet and prose-writer, sister of Alice Cary (q.v.): b. Cincinnati, Ohio, 4 Sept. 1824; d. Newport, R. I., 31 July 1871. She contributed numerous sketches to various periodicals; and with her sister published several books, among which are 'Poems and Parodies' (1854); and 'Poems of Faith, Hope, and Love.' She will be longest remembered as the author of the popular hymn beginning, 'One Sweetly Solemn Thought.'

Cary, Samuel Fenton, American politician: b. Cincinnati, Ohio, 18 Feb. 1814. He represented Ohio in Congress in 1867–9; was the only Republican representative to vote against the impeachment of President Johnson; and was an unsuccessful candidate for Vice-President in 1876, on the Independent, or so-called "Greenback" ticket headed by Peter Cooper.

Cary Rebellion, in North Carolina, an outcome of the religious and political disturbances set going by the constitution of Locke and Shaftesbury, whose laws and discriminations survived itself. (See CAROLINA, ORIGINAL CONSTITUTION OF.) One of these, requiring an oath to support the constitution and laws, debarred the Quakers (who were among the most influential of the early settlers, and by no means inclined to submit peaceably to oppression) from voting or holding office, or being witnesses in criminal suits. The establishment of and taxation for the Church of England was a common grievance to all the colony, nearly all its population being dissenters; and there were other obnoxious ordinances. At this time Albemarle County (North Carolina) had its separate deputy-governor, appointed by the governor of the entire colony; and in 1704 Sir Nathaniel Johnson so appointed Robert Daniel, a churchman, and "landgrave" or hereditary noble and councilor. He tried to enforce the laws; and one John Porter, an influential Quaker, shortly went to England to complain of him and of vexatious legislation against his sect. One of the proprietors, John Archdale (q.v.), ex-governor, was himself a Quaker, and induced the other proprietors to remove Daniel; and Johnson appointed Thomas Cary, a Carolina merchant, said to have been Archdale's son-in-law, in his place. Cary, however, felt bound to enforce the laws, and again the Quakers complained. Cary was removed (the accepted account says he was in ill odor with the proprietors for having been short in his accounts as collector of revenue for them); and this time the appointment of a deputy for Albermarle was taken from the governor, and a new proprietary council formed, with Porter and several other Quakers on it. On Porter's return to America in 1707, he convened the council, which elected William Glover, a churchman, president. Glover insisted on enforcement of the laws as before, and Porter's party turned against him, declared his election illegal, struck a bargain with Cary, and elected him president in Glover's place. Glover and his section refused to recognize the validity of the new election, and held their meetings in one room of the executive mansion, while Cary and his councilors met in the other. Daniel, as a landgrave, was *ipso facto* a councilor, and sat alternately in both. Each party issued writs for election to the Assembly, and it seems to have been held without formal recognition of either; but Cary's party held the majority. In 1710 Edward Hyde, a relative of Clarendon's, was appointed deputy-governor by the proprietors, and came out in August 1710 to assume office. His commission was to be taken from Tynte, who had succeeded Johnson; but Tynte had died, and Hyde had only his letters from the proprietors to show. The Cary party, however, was glad to acknowledge him so long as it held the power and he confirmed it; but the next Assembly was held by its enemies, Hyde apparently aided it in enforcing the laws in favor of the Church, and Cary's party promptly refused to acknowledge his authority and made open war on him. Cary attacked Edenton with two armed vessels, but was repulsed, and Hyde called on Gov. Spotswood of Virginia for help. Spotswood admitted that the revolters were "dangerous incendiaries," but said the country was almost inaccessible, and he had only militia; but finally sent some of his marines from the guard-ships at Hampton Roads. Cary, with his chief men, Levy, Truitt, etc., thereupon went to Virginia, apparently for temporary refuge, declaring that they would go to England and appeal to the proprietors. Spotswood took them at their word, and sent them, seemingly against their will, to England; and they disappear from history. That they

were discharged, however, is apparent from a circular letter of Lord Dartmouth to the colonies, at this juncture, to send no more prisoners to England for trial without proof of their guilt. At home, the burgesses refused to provide for the defense of the colony unless they could have share in the government and what they held to be their rights; and the result was a fearful desolation in a war which soon broke out with the Tuscaroras.

Ca'rya, a genus of American plants belonging to the order *Juglandaceæ. C. alba* is the common hickory. The seeds of *C. amara,* with oil of chamomile, are useful in colic. See HICKORY.

Caryatides, or **Caryatids,** kăr-ĭ-ăt'ĭ-dēz, in architecture, a name used to designate female figures made to support a roof, cornice, etc., instead of columns. The goddess Artemis (Diana), who had a temple in Caryæ, a Peloponnesian city, was for this reason called *Karyatis.* In honor of her, virgins danced in a festive procession during an annual feast, which suggested to architects the idea of adopting the images of virgins to serve as columns. Thus Lessing and others explain the name and form of the caryatides. Another explanation of their origin is the following: The inhabitants of Caryæ allied themselves with the Persians in their war with the Greeks. The Greeks, on the successful termination of that struggle, exterminated the males of Caryæ, and reduced all the women to slavery. As a mark of infamy, and to perpetuate the memory of the transaction, the architects of the time made statues representing these women in the servile office of supporting entablatures. Both explanations are somewhat doubtful.

Caryocar, kă-rī'ō-kăr, a genus of plants belonging to the natural order *Ternstrœmiaceæ,* consisting of lofty trees, natives of tropical America, which produce good timber. They have evergreen, ternate or pinnate leaves, and flowers in racemes. *C. nuciferum,* a species abundant in British Guiana, yields the kidney-shaped souari-nuts, or butternuts. Other species are *C. glabrum* and *C. amygdaliferum.*

Caryophyllaceæ, kăr-ĭ-ō-fĭ-lā'sẹ-ē, an order of plants, of which the pink, named by botanists in early times *Caryophyllus,* and more recently *Dianthus,* may be considered as the type. The plants of this order are readily distinguished by their opposite undivided leaves, without stipules, the tumid articulations of the stems, and the disposal of the seeds upon a free central placenta, surrounded by several carpellary leaves. Several species are cultivated by florists; a few are used in medicine, and the *Saponaria officinalis* and *Lychnis diurna* yield a mucilage resembling soap. The Clove-pink (*Dianthus caryophyllus*) is the origin of all the cultivated varieties of carnations, picotees, bizarres, flakes, etc. There are about 60 genera and 1,100 species.

Caryop'sis, the small peculiar, one-seeded, dry indehiscent fruit of the grasses, as wheat, barley, etc.

Caryo'ta, a genus of palms, with doubly pinnate leaves, the best-known species of which (*C. urens*) is a native of most of tropical Asia; it supplies an inferior kind of sago, and from its juice is made toddy or palm-wine. The leaf-stalks yield kittul fibre, which is used in making baskets, brooms, etc.

Ca'rysfort Reef, a coral reef near the southern extremity of Florida, on which is erected a lighthouse of the first order, 112 feet high.

Casa, Giovanni della, jō-vän'nē dĕl'lạ kä'-zä, Italian writer: b. Mugello, near Florence, 1503; d. Rome, 14 Nov. 1566. He studied in Bologna, Florence, and Rome, and entered as an ecclesiastic into the service of the two cardinals Alessandro Farnese, the first of whom, in 1534, ascended the papal chair, under the name of Paul III. He rose through various offices in the Church, including the archbishopric of Benevento, till Paul IV. made him his private secretary. His most celebrated work is 'Galateo, ovvero de' Costumi' (1560), a manual of good-breeding, to which another book, 'Degli Uffizj communi tra gli Amici Superiori e Inferiori,' forms a supplement. This last is a translation of his Latin treatise, 'De Officiis Inter Potentiores et Tenuiores Amicos.' The best and most complete edition of his works appeared at Venice (1752).

Casa Braccio, bräch'ō, Italian romance, by Francis Marion Crawford, published 1896. The first half of the novel is much the better.

Casa Grande, kä'zạ grän'dā, the ruins of a prehistoric building in Arizona, near the Gila River, within 20 miles of the Casa Grande station. Built of adobe with walls, in some places five feet thick at the base, narrowing toward the top, it is the best-preserved structure of a type which was probably widely distributed. The space enclosed by the walls now standing measures about 43 by 59 feet; and the walls, which are high, show that there were three, and perhaps four, stories. There are three central rooms and two end rooms. A large area surrounding this building is covered with mounds and débris of other buildings, indicating that there was originally a considerable settlement on the site. It was built by a Pueblo or allied race, and the evidence is in favor of the theory that they were the ancestors of the Pima Indians who now inhabit the region. In 1889 Congress made an appropriation for the preservation and repair of the Casa Grande, and the whole area has been made government property. During the removal of the débris a number of specimens of pottery and stone implements have been found. The ruins were seen by Coronado's expedition and mentioned by Catañeda; they were carefully described by Father Menge, who, with Father Pinto, visited them in 1694 and 1697. John R. Bartlett was the first to give a detailed description of them in modern times in his 'Personal Narrative of Explorations and Incidents in Texas, New Mexico, California, Sonora, and Chihuahua' (1849). The best and most recent accounts are found in the publications of the Bureau of American Ethnology (13th and 15th annual reports).

Casabianca, Louis, loo ē kä-zä-bē-än-kä, French naval officer: b. Bastia, Corsica, about 1755; d. 1 Aug. 1798. He sat in the National Convention of 1792; and in 1798 was captain of the flagship L'Orient in the expedition to Egypt. He was mortally wounded at the battle of the Nile, 1 Aug. 1798; the ship caught fire; his 10-year-old son would not leave him, and both were killed by the exploding of the ship. The story

of their death is the subject of Mrs. Hemans' well-known poem.

Casal, or **Cazal, Manuel Ayres de,** mä'nooĕl ī'rĕz dā kä-säl', Portuguese geographer: b. in the last half of the 18th century; d. Lisbon about 1850. Having received an excellent education, he took holy orders, but afterward devoted himself to the exploration of Brazil. He has been styled the father of Brazilian geography, and his principal work, entitled 'Corografia Brasilica' (1817), elicited the admiration of Humboldt and of other competent judges.

Casale, or **Casale de Monferrato,** kä sä lā mŏn-fĕr-rä'tō, Italy, a city in the province of Alessandria, on the right bank of the Po, 18 miles north-northwest of Alessandria. The citadel, founded by Duke Vicenzo in 1590, was one of the strongest in Italy, but its ramparts have been converted into promenades, and its defenses are now insignificant. In 1640 the Spaniards were defeated here by the Duc d'Harcourt, and the possession of the town was repeatedly contested by the Austrians and French during the wars of Napoleon. Casale was the capital of the ancient Montferrat. It is the seat of a bishop and of a district court of justice, and has a cathedral which is said to have been founded in the 8th century. Its church of San Domenico, containing a tomb in memory of the Princess Palæologi, is remarkable for the elegance of its design, and several fine works of art are found in other of its churches. Among the prominent articles of trade are silk, and sirup manufactured from the roots of a species of reed. Pop. about 32,000.

Casale Pusterlengo, kä-sä'lā pûs-tĕr-lĕn'gō, Italy, a town in the province of Milan, southeast of Lodi, beautifully situated in a fine plain between the Po and the Adda. It has a trade in Parmesan cheese. In 1796 the Austrians were attacked here by the French, and driven back to Lodi. Pop. 6,304.

Casalmaggiore, kä-säl-mäd-jō rē, Italy, a town in the province of Cremona, and 22 miles southeast of the city of Cremona (with which there is railway connection), on the left bank of the Po. There are a cathedral and other churches, theatre, etc. The manufactures include pottery and glass-ware; and there is a trade in wine, grain, hemp, and cheese. In 1448 the Venetians were defeated here by Francesco Sforza. Pop. 15,648.

Casamicciola, kä-sä-mē'chō-lä, Italy, a favorite watering-place on the island of Ischia, beautifully situated in a valley on the north side of Monte Epomeo, with hot springs (158° F.), baths, hotels, etc. The season extends from June to September. By the earthquake of 28 July 1883, the place was almost entirely destroyed.

Casanare, kä-zä-nä'rę, a river of the Republic of Colombia, which flows through a region called by the same name, and after an easterly course of 180 miles empties into the Meta.

Casanova, Francesco, frän-chĕs'kō kä-sänō'vä, Italian painter: b. London 1730; d. Brühl, near Vienna, 1805. He went to Venice with his parents, was in Paris in 1751, but after a brief stay went to Dresden, where he remained from 1752 to 1756. Here he studied and copied the paintings of Wouverman. He acquired renown as a painter of battle pieces, and was admitted to the Academy of Fine Arts in 1763. Catherine II. of Russia employed him to paint her victories over the Turks. He settled in Vienna in 1785, and the gallery there contains several of his paintings.

Casanova de Seingalt, Giovanni Jacopo, jō-vän'nē yä'kō pō kä-sä-nō'vä dĕ săn-gäl, Italian adventurer: b. Venice 1825; d. Düx, Bohemia, 4 June 1798. He was the son of an actor and actress; he studied law at Padua, but gave this up to study for the priesthood. He was expelled from the Seminary of St. Cypsian for a scandalous intrigue, and was also imprisoned for a short time. The influence of his mother procured him a place in the establishment of Cardinal Aquaviva, but he did not retain it long; and after visiting Rome, Naples, Corfu, and Constantinople, in the characters of diplomatist, preacher, abbot, lawyer, and charlatan, he was imprisoned at Venice in 1755, but escaped owing to his wonderful keenness and skill. In his travels throughout Europe he formed associations with many distinguished characters, Louis XV., Rousseau, Voltaire, Suvaroff, Frederick the Great, and Catherine II. His most celebrated work is his 'Memoirs' (1828–38), in which he relates with a cynical freedom the whole of his extraordinary adventures, and presents a picture of society without conventional disguise. Among his dupes were Mme. de Pompadour, Frederick the Great, and even that other prince of charlatans, Cagliostro. Besides his 'Memoirs,' Casanova was the author of several works of history or imagination in French and Italian, which show the versatility of his genius. The most remarkable are 'Recit de sa Captivite' (1788), and a translation in verse of the Iliad.

Casas, Bartolomé de las, bär-tō'lō-mā dā läs kä'säs, Spanish prelate: b. Seville 1474; d. Madrid July 1566. In his 19th year he accompanied his father, who sailed with Columbus, to the West Indies. Five years afterward he returned to Spain, and pursuing his studies he entered the priesthood. He accompanied Columbus in his second voyage to Hispaniola (Haiti), and on the conquest of Cuba settled there, and distinguished himself by his humane conduct toward the oppressed natives. He set at liberty the Indians who had fallen to his share in the division; and so much was he interested for them, that in 1516 he went to Spain to lay a statement of their case before King Ferdinand, whose death at that time prevented any measures for their benefit. The regent, Cardinal Ximenes, however, appointed a commission to examine circumstances on the spot, and to determine accordingly. Las Casas was to accompany them, with the title of Protector of the Indians. The commissioners found that it was impossible to liberate the Indians, and therefore endeavored to secure their humane treatment; but Las Casas, still dissatisfied, remonstrated so warmly that he was obliged to take refuge in a convent from the rage of the planters. He again returned to Europe; and on the accession of Charles V., in consequence of his representations, the council appointed a chief judge to re-examine the points of controversy between the partisans of Indian liberty and the colonists. Las Casas, in his zeal for the Indians, became the author (or the encourager at least) of the slave-trade, by proposing to pur-

chase negroes from the Portuguese in Africa to supply the planters with laborers, of the want of whom they complained; and this was unfortunately put into execution. He next applied for a grant of an unoccupied tract, in order to try his own plan with a new colony. This he at length obtained, and with 200 persons, whom he persuaded to accompany him, landed at Porto Rico in 1521, but found that an expedition was advancing to ravage this very tract, and convey its inhabitants to Hispaniola as slaves. He endeavored in vain to prevent the threatened danger, and with the few who still adhered to him returned to Hispaniola to solicit succor. During his absence the natives attacked the colonists with such success that in a short time not a Spaniard remained in that part of South America. Las Casas, in despair at the failure of his project, retired to the Dominican convent at St. Domingo, and assumed the habit of the order. Notwithstanding his retirement his zeal in the cause of the Indians did not abate; and being sent on a mission to Spain by a chapter of his order at Chiapas in 1542, he pleaded their cause with his pristine warmth, and composed his famous treatise 'Brevisima Relacion de la Destruccion de las Indias,' in which he exposed the cruelties practised by the Spaniards. His unremitting perseverance at length obtained a new set of laws and regulations, by which the natives were greatly relieved. In 1544 he returned to America as bishop of Chiapas, but left it three years later, and resigned his bishopric in 1550. Besides the treatise above named he wrote 'Historia de las Indias.' This was first printed in 1875–6. It is one of the most notable of books, not only in its contents,— as a history of Spanish discoveries from 1492 to 1520, and a contemporary Spanish Catholic criticism as well as story of Columbus,— but in the circumstances which prevented its publication for more than 300 years, and which still leave it inaccessible except to readers of Spanish. See Llorente, 'Œuvres de las Casas' (1822); Quintana, 'Vidas de Espagñoles Celebres'; Helps, 'Life of Las Casas and Spanish Conquest' (1868); Fabie, 'Vida y Escritas de Las Casas' (1879); Sabin, 'Works of Las Casas' (1870).

Casas Grandes, kä'säs grän'däs (Span. "great houses"), a town in Chihuahua, Mexico, on the Casas Grandes or San Miguel River, 35 miles south of Llanos, and 125 miles southwest of El Paso, remarkable for a number of ruins, apparently relics of an aboriginal race. These ruins are found about half a mile from the small Mexican village, partly on the declivity of a small hill, and partly on the plain at its foot. They consist chiefly of the remains of a large edifice of the pueblo type, built entirely of a substance resembling adobe, mud mixed with gravel and straw and formed into blocks 22 inches thick and about three feet long. The portions which must have been constructed of wood have entirely crumbled away. The outer walls are almost all prostrate, except at the corners, and were probably only one story high; the inner walls are better preserved, varying in height from 5 to 50 feet, and being in some cases five feet thick at the base. The portions remaining erect seem to indicate an original height of from three to six stories. The doorways have the tapering form noticed in the ancient structures of Central America and Yucatan, and over them are circular openings in the partition walls. The stairways were probably of wood, and placed on the outside. Clavigero, in his 'History of Mexico,' tells us that the building, according to popular tradition, was erected by the Mexicans in their peregrination, and that it consisted "of three floors, with a terrace above them, and without any entrance to the lower floor. The door for entrance to the building is on the second floor, so that a scaling ladder is necessary." The main features of the edifice seem to have been three large structures connected by ranges of corridors or low apartments, and enclosing several courtyards of various dimensions. The extent from north to south must have been 800 feet, and from east to west about 250 feet. A range of narrow rooms lighted by circular openings near the top, and having pens or enclosures three or four feet high in one corner, supposed to be granaries, extends along one of the main walls. Many of the apartments are very large, and some of the enclosures are too vast ever to have been covered by a roof. About 200 feet west of the main building are three mounds of loose stones and 200 feet west of these are the remains of a building, one story high and 150 feet square, consisting of a number of apartments ranged around a square court. The inhabitants of this communal structure seem to have disappeared long before the Spaniards noticed the ruins in the latter part of the 17th century. Throughout the northern part of Mexico the name Casas Grandes is applied to deserted buildings of a similar type.

For some distance south the plain is covered with tracts of ancient buildings, and for 20 leagues along the Casas Grandes and Llanos rivers are found artificial mounds from which have been dug up stone axes, corn-grinders, and various articles of pottery, such as pipes, jars, pitchers, etc., of a texture far superior to that made by the Mexicans of the present day, and generally ornamented with angular figures of blue, red, brown, and black, on a red or white ground. The best specimens command a high price in Chihuahua and neighboring towns. On the summit of a mountain, about 10 miles from the ruins above described, are the remains of an ancient stone fortress, attributed to the same people who built the Casas Grandes, and probably intended as a lookout. See PUEBLOS.

Casati, Gaetano, gä-ä-tä'nō kä sä'tē, Italian explorer in Africa: b. Monza, Italy, 1830; d. Como 7 March 1902. He entered the army of Piedmont at 21, and resigning in 1879 went to Africa, commissioned by the Società d' Esploragione Commerciale d' Africa. He joined his countryman, Gessi Pasha, in the Bahr-el-Gazelle valley, but the schemes of the Mahdi in 1883 shut him up in the Niam-Niam region with Emin Pasha. At the request of the latter he consented to act as "President" in King Kabba Rega's country, but after being at first well treated by that monarch he was later condemned to death. Escaping with great difficulty to the Albert Nyanza Lake, and losing all his notes and manuscripts, he was finally rescued by Emin Pasha in 1888. The expedition of Stanley came a little later to the relief of both. On his return to Italy Casati published a volume descriptive of his adventures, entitled 'Dieci anni in Equatoria.'

Casaubon, Isaac, ē-zäk kä-zō-bôn, Swiss classical scholar: b. Geneva 18 Feb. 1559; d. London 12 July 1614. In his ninth year he spoke Latin fluently. In his 19th year he entered the university at Geneva, where he studied Greek, theology, the Oriental languages, etc., and in 1582 succeeded Portus as professor of the Greek language. In 1586 he married the daughter of the famous printer Henry Stephens. In 1596 he accepted a professorship of Greek and belles-lettres at Montpellier, but held it only two years. In 1600 Henry IV. invited him to Paris. His Protestantism, the jealousy of other scholars, and perhaps his rather unyielding character, were the occasion of many unpleasant occurrences, for which, however, he was indemnified by the office of royal librarian. After the death of Henry IV. in 1610 he went to England on the invitation of the Archbishop of Canterbury, where he was received with distinction, was presented with a prebend in Canterbury Cathedral, and had a pension conferred on him by James I., with whom he was a great favorite. He was buried in Westminster Abbey. Casaubon was a liberal theologian, a man of extensive learning, a good translator, and an excellent critic. As a critic, he commented on Diogenes, Laertius, Aristotle, Theophrastus, Suetonius, Persius, Polybius, Theocritus, Strabo, Dionysius of Halicarnassus, Athenæus, Pliny the Younger, etc. Nearly all the ancient classics are indebted to his valuable researches. His profound dissertation on the satirical poetry of the Greeks and the satire of the Romans ('De Satyrica Græcorum Poësi et Romanorum Satyra') deserves particular praise. His theological writings are of less value. His diary, which had been preserved by his son, Meric, was published in 1850 under the title of 'Ephemerides.' An admirable 'Life of Casaubon' has been written by Mark Pattison' (1875).

Casaubon, Meric, son of the preceding, Swiss classical scholar in England: b. Geneva 14 Aug. 1599; d. Oxford 14 July 1671. He went to school at Sedan, and in 1611 followed his father to England, and studied at Eton and Christ Church, Oxford. He held successively several livings in the Church, when the revolution, which brought Charles I. to the scaffold, deprived him of his income. Still he rejected the proposal of Cromwell to write the history of his time, as also the invitation of Queen Christina to live in Sweden. On the return of the Stuarts he was rewarded for his loyalty by restoration to his offices in the Church, which he held till his death. Besides various works in Latin, he wrote several in English on theological and other subjects. He also wrote some critical works on the classics, a treatise, 'De Verborum Usu' (1647); etc.

Casbin. See KASBIN.

Casca, Publius Servilius, Roman conspirator: d. 42 B.C. He assisted in the assassination of Julius Cæsar in 44 B.C., and according to Plutarch, he struck the first blow, in the back of the neck.

Cascade Range, a range of mountains in North America, parallel to and about 120 miles from the Pacific coast, extending from the Sierra Nevada in California northward through Oregon and Washington into British Columbia. The highest peaks are Mount Rainier in Washington, 14,526 feet, and Mount Shasta in California, 14,440 feet. The name is derived from the cascades formed by the Columbia River in breaking through the range.

Cascape'diac River, Great, a river of Canada, in the province of Quebec, flowing southeast into Chaleur Bay. Its length is 150 miles.

Cascapediac River, Little, a river of Canada, in the province of Quebec, east of the Great Cascapediac and with an almost parallel but shorter course.

Cascara Sagrada, the bark of a northwestern tree (*Rhamnus Purshiana,* or California buckthorn), of the natural order *Rhamnaceæ.* The composition of cascara is extremely complex, but its main action is due to the volatile oils, the anthracene resins, at least three, the amaroids, and the tannin. It stimulates peristalsis, increases the intestinal juices, and has marked effects on general excretion. It is an excellent laxative, and one of the very best cathartics for habitual and chronic constipation. It is best used in the form of a fluid extract. Because of its valuable properties, many patent drugs with similarly sounding names have been foisted on the public. These mostly contain other and more powerful and pernicious cathartics. See BUCKTHORN; RHAMNUS.

Cascarilla, the bark of a tree (*Croton eleuteria*), of the family *Euphorbiaceæ.* This is a shrub of the Bahamas and now yields most of the cascarilla of commerce, although in former years other species were used. It contains tannic acid, volatile oils, cascarillin, a glycoside, and some resin. In medicine it is used as an aromatic bitter in combination with other remedies for constipation, indigestion, and loss of appetite.

Cas'co Bay, a bay on the southwest coast of Maine. It is about 20 miles wide and so deep as to constitute one of the best harbors of the world, for all kinds of vessels. It contains many islands.

Case, Augustus Ludlow, American naval officer: b. Newburg, N. Y., 3 Feb. 1813; d. Washington, D. C., 17 Feb. 1893. He entered the navy as a midshipman in 1828. In the Mexican war he took part in the capture of Vera Cruz and Tobasco, and during the Civil War served as fleet-captain of the North Atlantic blockading squadron. He took part in the capture of Forts Hatteras and Clark, and cut out the blockade-runner Kate, under the fire of the forts at New Inlet, N. C. He was a lighthouse inspector in 1867; chief of bureau of ordnance, 1869; commander of the European squadron in 1873; and was retired in 1875.

Case, Leonard, American philanthropist: b. Cleveland 27 June 1820; d. 6 Jan. 1880. He graduated at Yale College in 1842, and continued to pursue literary and scientific studies, contributing to the best magazines. Inheriting from his father a large estate in the city of Cleveland, he deeded a certain part of it for the founding and maintenance of an educational institution, which was incorporated after his death as the Case School of Applied Science (q.v.).

Case, Thomas, English philosophical scholar. He was educated at Rugby, and Balliol College, Oxford, and has been Wsynflete professor of moral and metaphysical philosophy at

Oxford from 1889. He has published 'Materials for History of Athenian Democracy from Solon to Pericles' (1874); 'Realism in Morals' (1877); 'Physical Realism' (1888); 'St. Mary's Clusters' (1893).

Case, in grammar, a form, modification, or inflection of a noun or pronoun, indicating or corresponding to its relationship to some other word or words in a phrase or sentence, as, John (nominative case) speaks; John's (possessive) dog barks; John beats his dog (objective). In adjectives, case is merely sympathetic, the adjective agreeing in case with the noun which it qualifies. In English, nouns undergo only one inflection representing a different case from the nominative or general form of the noun; all other cases are represented either by prepositions or by the position of the noun in the sentence, the nominative case usually preceding the verb, the objective or accusative following it. The single inflected case in English is the possessive or genitive (John's). English pronouns have three cases — nominative, genitive, and accusative, as *he, his, him.* The last often serves as a dative. Adjectives undergo no modifications in English. In Sanskrit there are eight cases — nominative, accusative, instrumental, dative, genitive, ablative, locative, and vocative. In Latin there are six cases — nominative, genitive, dative, accusative, vocative, ablative. In Greek there are five, the ablative not being used. In both Latin and Greek there are traces of a locative case. In French, Italian, Spanish, and Portuguese, the nouns have no case-inflections. In German both nouns and adjectives are inflected for case. There are four cases in German — nominative, genitive, dative, accusative.

In law, the word has various meanings. An "action upon the case" is one in which damages are sued for, for some cause of complaint where the injury done is not direct, as in trespass, but consequential. A "case stated" is a statement prepared by one court for the decision of a point of law by a superior court. A "special case" is a written statement of facts agreed on by two or more litigants in an action, in order that a court may decide their legal effect.

In letter-press printing, a case is a receptacle for types, generally made of wood, 34 inches long, 15 inches wide, and 1¼ inches deep, and divided into compartments or "boxes," each of which contains types of one class or letter. A pair of cases consists of an upper and a lower case; the upper one has 98 boxes, and contains the capitals, small capitals, and some other signs that are only occasionally required in composition; the lower one has 54 boxes, and holds the letters of the small characters, figures, spaces, and most of the points. Thus the small characters are habitually spoken of by printers as "lower-case" letters, and the capitals, etc., as "upper-case" letters. The places assigned to the several letters of the alphabet in the boxes of the case are not precisely the same in all printing-offices, but the differences are few. The different sizes of the boxes in the lower case depend upon the comparative frequency with which the several letters occur in the composition, and the position in the case allotted to each letter is such as to afford the greatest facility in composing. The letter *e,* which is most run upon in the English language, has a box much larger than any of the other compartments, and is placed directly in front of the compositor. In the upper case the boxes are of uniform size, and the letters are placed in nearly alphabetical order, the comparatively rare occurrence of capitals rendering it less important which letter is nearest the compositor's hand. Cases are mounted in a slanting position upon a frame of convenient height.

Cases are named from their use or construction, as "Italic case," a two-third case for holding Italic type; "two-third case," a single case in which two thirds of the space is equivalent to the ordinary lower case, and the remaining third is occupied by the capitals, etc.; "job case," a single case suited to holding a small job font of type; "rule case," a case for holding brass rule; "sort-case," a case for containing "sorts." The manufacture of cases has received a serious setback since the introduction of type-composing machines. See PRINTING.

Case-hardening, the process of converting the surface of certain kinds of malleable-iron goods into steel, thereby making them harder, less liable to rust, and capable of taking on a better polish. Fire-irons, gun-locks, keys, and other articles of limited size, are very commonly so treated, but the process is sometimes applied to large objects, such as iron railway-bars. The articles are first formed, and heated to redness with powdered charcoal or cast-iron, the malleable iron taking carbon from either of these to form a skin of steel upon it; the heated objects are then cooled in cold water, or in oil when they are of a delicate nature. Yellow prussiate or potash or parings of leather have also been a good deal used for coating iron articles with steel by heating them together. Some chemists consider that in this case nitrogen combines with the iron and effects the hardening. The coating of steel is very thin, seldom exceeding one sixteenth of an inch. A Swedish ironmaster has found that a very excellent case-hardening is obtained by treating iron or steel objects with a mixture of animal matter, such as rasped leather or horn, and arsenious acid dissolved in hydrochloric acid, and heating as usual.

Case School of Applied Science, The, at Cleveland, Ohio, founded by Leonard Case (q.v.) of that city. In 1877 a deed of trust was executed setting apart certain real estate for the support of the institution, the deed to take effect upon his death, which occurred in 1880. The Case School was incorporated 29 March 1880. Instruction began in 1881, with a class of 16 students, the school being carried on from that time until the summer of 1885 in the old Case homestead. A commodious building having been erected for the use of the school, it was occupied at the beginning of the term in September 1885. A year later the building with all that it contained was destroyed by fire. It was promptly rebuilt and occupied in 1888. Since that time several additional buildings for laboratory and shop exercises have been erected, with superior apparatus and appliances, and museums are in the course of development. The Case School of Applied Science offers eight regular courses of instruction, each requiring four years. They are civil engineering, mechanical engineering, electrical engineering, mining engineering, physics, chemistry, architecture, and general science. There are 126 professors and

instructors and 353 students. The degree of bachelor of science is granted to all who complete one of the regular courses. That of master of science may be conferred upon graduates who have devoted at least one year exclusively to graduate study. Professional degrees, namely, civil engineer, mechanical engineer, electrical engineer, and engineer of mines may also be conferred after one year of graduate study or after professional work in positions of responsibility, for three years after graduation. The property left by Mr. Case as an endowment for the support of the school is valued at about $2,000,000, and the amount invested in buildings and equipment is about $350,000. The school derives its support in part also from tuition fees. Its government rests with a corporation consisting of 20 men, from whom six, known as trustees, are selected.

Case-shot, a projectile formed by putting a quantity of bullets into a cylindrical tin box called a "canister," that just fits the bore of the gun. In case of necessity, the canister is filled with broken pieces of iron, nails, stones, etc. The case is closed at both ends by a disk of wood or iron. Shot of this sort is thrown from cannons and howitzers, and is very injurious to the enemy, because the balls contained in the canister spread, diverging in proportion to the distance. The balls vary in weight, according to the character of the ordnance, from one or two pounds to half an ounce each. The range within which case-shot are used sometimes extends to 500, but seldom exceeds 200 to 300 yards. It is also called "canister-shot." The shrapnel-shell, in its present cylindrical shape, may be considered a variety of case-shot. See ORDNANCE.

Case-worm. See CADDIS-FLY.

Casein, kā'sē-ĭn (Lat. *caseus,* "cheese") a substance resembling albumen in its general properties, and obtained from milk. The older chemists gave the name "casein" both to the precipitated substance that is now known by that name, and to the corresponding substance as it exists in solution in the milk; but it is usual at the present time to distinguish the latter as "caseinogen." Caseinogen is the principal nitrogenous constituent of milk, and is precipitated as a curdy mass when acetic acid or a mineral acid is added to milk that has been previously diluted by the addition of its own bulk of water. If the caseinogen so prepared is made into a paste and then treated with a small quantity of rennet, the mass sets at once into a solid clot, consisting of true casein; but Hammarstein has shown that if the caseinogen is first washed entirely free from calcium phosphate, rennet is without action upon it. The precise function of the calcium phosphate is obscure, and the same may be said of the chemical relations of the proteids in general. If rennet is added to fresh milk a bulky deposit of casein comes down immediately; but to obtain the casein in pure form, the oily matters in the milk should be first removed by the action of a centrifugal separator, and the casein, after precipitation, should be compressed so as to expel as much of the whey as possible. Caseinogen is not precipitated by heat, nor does it (like fibrinogen) coagulate spontaneously. The coagulation observed when milk is boiled is due to the albumen present, and not to the casein; and that which occurs upon standing may be due either to the generation of lactic acid through the fermentation of the lactose present, or to the rennet-like action of the ptomaines liberated by micro-organisms that happen to fall into the milk from the air. According to the analyses of Chittenden and Painter, the elementary percentage composition of casein is as follows: Carbon, 53.30; hydrogen, 7.07; nitrogen, 15.91; sulphur, 0.82; phosphorus, 0.87; oxygen, 22.03. Casein is insoluble in water, but dissolves easily in alkaline solutions. It also dissolves in very weak hydrochloric acid, from which it is again precipitated upon the addition of the same reagent in more concentrated form. When freshly prepared it is soluble in a strong solution of borax, and in this form it is used as an adhesive under the name "casein glue." A compound of casein with lime is also used in the arts for "animalizing" cotton cloth, so that the fibres will retain colors that otherwise would not adhere to them. See PROTEID.

Casemates (Sp. *casa,* "a house," and *matare,* "to kill"), in fortification, vaults which are proof against bombs, and which may be constructed under a parapet and provided with embrasures or ports through which guns are fired. They may serve, at the same time, as a place for keeping the heavy ordnance and various stores, and in case of necessity as habitations for the garrison or shelter for sick or wounded.

Caserta, kä-zär'tä, Italy, the capital of the province of Caserta, 17 miles northeast of Naples. It is the seat of a bishop, and contains many fine buildings. The principal edifice is a palace, one of the finest in Europe, a large and richly decorated structure commenced in 1752 by Charles III. of Spain, and situated among gardens adorned with numerous ancient and modern statues. The principal manufactures are silk goods, carpets, linen, etc. The district produces excellent fruit and wine. About two and a half miles to the northeast is Caserta Vecchia (Old Caserta), the new town being distinguished as Caserta Nuova. Pop. 33,000.

Caserta (formerly TERRA DI LAVORO), a province of Italy, north of Naples, along the Mediterranean Sea. Its chief industries are agriculture and cattle raising; there are also some flourishing manufactures. Area, 2,033 square miles. Pop. 749,414.

Casey, Silas, American army officer: b. East Greenwich, R. I., 12 July 1807; d. Brooklyn 22 Jan. 1882. He was graduated from the United States Military Academy at West Point in 1826; served in the Mexican war, being present at the battles of Contreras, Churubusco, Molino del Rey, and the siege of Chapultepec. When the Civil War broke out he was given charge of organizing the volunteers near Washington; later served in the Army of the Potomac, and won much distinction at Fair Oaks; was president of the board to examine candidates for officers of colored troops in 1863–5; brevetted major-general, U. S. A., 13 March 1865; and retired in 1868. His publications include 'System of Infantry Tactics' (1862); and 'Infantry Tactics for Colored Troops.' (1863).

Casey, Thomas Lincoln, American military engineer: b. Sackett's Harbor, N. Y., 10 May 1831; d. Washington, D. C., 26 March 1896. He graduated from West Point in 1852, and entered the engineer corps of the army. During the Civil War he was superin-

tending engineer of defenses on the coast of Maine, and on special duty with the North Atlantic squadron in the first expedition against Fort Fisher. In 1865 he was brevetted colonel for gallant services during the war. In 1868 he was put in charge of one of the departments in the chief engineer's office at Washington; in 1873 was sent abroad for professional service; and in 1877 was placed in charge of the construction of the state, war, and navy building, and of the Washington aqueduct, and also of the Department of Public Buildings and Grounds. Later he built the White House conservatory and the Army Medical Museum, completed the Washington monument, and took charge of the construction of the Congressional Library. He was president of the board of engineers for fortifications at New York in 1886–8; was promoted chief of engineers and brigadier-general in 1888; and was elected to the National Academy of Sciences in 1890.

Cash Register, an automatic mechanism for registering money accounts. It is probably the most antique and, yet in its improved form, the most modern appliance known to commerce. The ancients, more than 6000 years ago, used a registering device, termed an Abacus, for the purpose of indicating visibly to the seller and buyer the amount purchased. The cash register is an absolute necessity. By infallible mechanism it provides not only a correct registration of all the cash received, but at the same time, with the aid of a miniature printing press, it records or prints the details of each and every transaction that occurs, upon a printed strip or tape, thus keeping the proprietor in constant touch with each and every detail of his business, and offering him at a glance, a thousand times a day, if necessary, without the slightest trouble or inconvenience, a diagram of the progress of each department in his store, as well as the industry of each clerk. The push of the industrious one can be noted and appreciated. It furnishes a chart that enables the business man to direct and control his affairs as the pilot controls the movements of his vessel by the compass before him. The miniature printing press attached to the modern cash register also cuts off and issues a printed check or bill, which is handed by the clerk to the customer for payment to the cashier, thus saving a great amount of time and unnecessary labor in writing. The use of the modern cash register is indispensable to the business man, because it furnishes him with a labor-saving device of unerring accuracy for the most sensitive and vital part of his business, "his cash and credit." The prime object of a cash register is to protect and secure a correct accounting of all the cash received or paid out, and where a credit business is done, to so systematize the accounts as to insure a correct record of the same. The good qualities of the modern cash register consist in boldly proclaiming or indicating each and every transaction, and correctly recording or transmitting the indication to the adding and printing mechanism, so that the customer, clerks and proprietor may depend upon a correct accounting of each and every detail of the business.

HENRY S. HALLWOOD,
Hallwood Cash Register Co., Cleveland, O.

Cash Register Industry. The cash register industry originated in the United States, which now exports each month large invoices of costly and improved registers to every civilized country. No such mechanisms have ever been imported into the United States; and indeed none are in general commercial use in Europe which were not manufactured in this country.

The simplest of such devices are what are known to the trade as Autographics; they are a box with, maybe, a cash drawer, a spring to open the same, a bell to be rung by the opening of the drawer, a roll of paper to be written on and then pass out of sight, for reference and preservation. Many of these autographics, for petty convenience, are manufactured; they require little notice, as they do not differ in principle from a pencil and slate.

The improved cash registers which have created an industry are in extensive use in retail stores, for the purpose of preserving a record of the sales made. Their primary object is to afford a convenient means of making a record, and to insure the accuracy of it, so that the proprietor may know at the end of each day the exact amount of the day's sales, and that each has been accurately and honestly registered. The essentials of such a mechanism have been stated to be: (1) a series of operating keys representing different amounts of money; (2) a registering mechanism upon which the values of the operated keys are added and preserved; (3) an indicating mechanism by which, when any key is operated, an indicating tablet representing the value of such key is exposed to view; (4) an alarm which is sounded by the operation of each key, to call attention to the exposed indication; and usually, (5) a money drawer which is automatically unlocked and thrown open at the operation of any one of the keys. The indicating mechanism gives utility to the machine by compelling the clerk to operate the proper key when he registers each sale. It is the protective element of the machine. Cash registers of the most improved type are not only widely used in stores, but, it is claimed, are "needed and can be sold wherever cash is handled."

The cash register industry has been wholly created within the last twenty years. Certain inventions, contributing some essentials of a successful register, had been known before at home and abroad; but in 1883, these were only models on paper, and no cash register had then been devised which was in commercial use in this or any other country. Prior to this date, however, the National Manufacturing Company at Dayton, Ohio,—a name since changed to National Cash Register Company—was making these machines under the Ritty & Birch patents, which were afterward upheld by the Supreme Court of the United States. They covered an improved device for holding and releasing the indicators.

None of the prior patented devices had either gone into use, or were fitted for practical use; so that in a commercial sense, Ritty & Birch were not only pioneers as to the extent of their improvement, but the actual creators of the first practical cash registers as a whole. The Ritty & Birch invention "brought success to what prior inventions had essayed and in some part accomplished."

The advantage thus obtained was followed

by great business enterprise and the liberal encouragement of further invention; the National Company now owns 537 Letters Patent of the United States and 394 foreign patents; and in its five invention departments at its factory, employs a corps of inventors, who are followed by forty skilled mechanics doing experimental work.

This company maintains branch factories at Berlin, Germany, and Toronto, Canada; but its main factories are at Dayton, Ohio. Here they occupy nine buildings, covering 892,144 square feet of floor space, and 140 acres of ground. In convenience and attractiveness, and for light, heat, ventilation and all sanitary things, these structures are designed to be models of any use for factory purposes. They have an output of about 5,000 machines per month; mostly of the newer and costlier kinds; about one-third of which are exported to foreign countries. These exported cash registers are adapted to the various currencies of England, Germany, Austria, Hungary, France and Belgium, Norway and Sweden, Holland, Spain, Cuba and Mexico and all Spanish-speaking countries, Brazil and Portugal, India, also Russia. Registers are sold for use in Japan and China, but not yet in the currency of those countries.

Among the more important improvements which inventors have worked out into practical advantage on a cash register may be named:

1. The totalizing counter, which adds all the registrations into one total.

2. The tape-printer, which prints the amount of each registration.

3. The check-printer, which prints, cuts off and throws out a check giving the figures of each registration, with the initials of the clerk making the sale.

4. The throw-out counter, which made it possible to print the amounts of all transactions on the detail tape and check which is issued, but prevents any amount, other than cash transactions, being so added into the totalizing counter.

5. A variation of the foregoing, which adapted it to print, instead of a check, an itemized bill, such as is used in the larger stores and offices.

6. The multiple-counter, which provides a separate adding mechanism for each person who operates the machine.

7. The multiple-drawer feature, or a series of cash drawers attached to one machine, giving the equivalent of many machines in one. This feature may be attached to the different types of registers, and gives the advantage of a separate machine for each individual, so that separate records are made not only of the transactions of each, but mistakes of any one of the different number of clerks using it, are readily identified.

8. Distant indication, which is a means for electrically indicating at a distance; namely, in the proprietor's office, home, or front show window, the sales made as registered on the machine.

Among newer improvements of cash registers are: (1) the application of electricity as a motive power, giving great rapidity of operation and saving of manual work; and (2) the application of cash registering mechanisms to conform to the special requirements of systems of express companies, telegraph companies, banking offices, department stores, post-offices, railroad offices, wholesale houses, telephone stations and government departments.

Firms who have, in the United States, made and sold cash registers are, or have been, Hopkins & Robinson, at Louisville; The Boston Cash Register and Indicator Co.; the Bensingers, at Chicago; the Sun, at Greenfield, Ohio; the Hallwood, at Columbus; the Kruse Co.; the Union, at Trenton, N. J.; the Globe and the Osborne, at Detroit; The Ideal, of New Jersey; the Chicago Cash Register Co.

Most of these manufacturers are out of active business, but they sold nearly all registers which remain in use in this country that are not Nationals. A cash register has this peculiarity about it, not common to other manufactured things,—the user often does not want it to work rightly; hence, to have value at all, it requires very high workmanship and perfection of part; and any device not so built, has not, thus far, been a commercial success. A good cash register must be one that cannot be beaten. To "beat" a register is to apparently operate it without proper indication and addition in registration. It must be built so as not only to operate accurately, but so that it cannot be prevented from working properly.

The National factory at Dayton employs 3,500 working men and women. About 40,000 persons annually visit this factory. A general interest, which this seems to indicate, and certain unique and perhaps original features in the factory methods of the National Cash Register Company, may justify a few words in explanation of them:

"There is no factory superintendent, but in place of such an official a chairman and a factory committee which holds daily or frequent sessions. This chairman after conference and advice from the committee, directs all departments in the making force. In and over each of all the departments, are subordinate committees, with a chairman who has like authority; and these all work in co-operation."

Nearly all important orders received by employes are first discussed and revised by these committees. In all the selling force, this system, "combining the methods of a military organization and a democracy into a somewhat novel co-operation," are in fixed and successful use. Liberal expenditures by the National Company and co-operative organization of employes for their "welfare work" seem to have won a deserved repute, at least are successfully carried out.

For officers and many of the men and women employes, attractive lunches are provided, for which a moderate charge is made, not intended to be the whole cost; training schools for employes, their children and others in the neighborhood; calisthenics, a dancing school, a boys' garden, rest rooms with a trained nurse and free baths on the company's time, libraries, and a cooking school are some of the interesting features annexed at the company's cost, to the factory work.

In connection with, and as a part of its system of co-operation, the company has paid out in the last five years, for prizes for suggestions alone, $10,152.68. During the year 1903, 5,078 suggestions were submitted in writing by the factory and office employes, of which number 1,536 were adopted, after having been first

passed to a special committee for careful examination and report. The company claims these "welfare" expenditures pay in the good will proffered, and in the good will and better work they produce.

A. A. THOMAS,
Secretary National Cash Register Co.

Cashan or **Kashan** or **Kashin,** a town of Persia in the province of Irak-Ajemee, noted for its production of shawls, silk stuffs, and other goods. It is one of the most flourishing towns in Persia, and has a royal palace, numerous mosques, colleges, bazaars and baths. The inhabitants are noted for their industry, and besides shawls and silk stuffs already mentioned, they manufacture copper goods, gold and silver articles, brocade and cottons. They also have an active trade in agricultural produce, and carry on commerce with all parts of the Orient and with Europe by way of Ispahan. The silk stuffs produced at Cashan are held in high esteem, and are worn largely by the Shah and his entourage. Foreigners from the West who have visited the place have found the inhabitants, who belong chiefly to the Shiite sect of Mohammedans, more enlightened and liberal in their treatment of strangers than most Orientals. Many of the merchants are very wealthy, but are compelled by the oppressive exactions of public officials to hide their riches as much as possible from view. The interior of the homes of some of them, which present a neglected aspect on the outside, are said to be palatial in splendor. The province of Irak-Ajemee, in which Cashan is situated, has nearly the same boundaries as the country known to the ancients as Great Media, or Media Proper. It is the most productive portion of Persia, fertile and with a flourishing trade. Cashan has a population of about 15,000. See PERSIA.

Cash'el, Ireland, a town in Tipperary County, about 49 miles northeast of Cork; noted as containing the most interesting ruins in Ireland. These consist of a Gothic cathedral founded in 1169; a stone-roofed chapel, built in 1127; Hore Abbey, founded in 1260; the palace of the Munster kings; and a round tower, 90 feet in height and 56 feet in circumference. They are built on the Rock of Cashel, forming the summit of the slope which the town occupies. Here was held the great synod, in 1172, when the Irish priests first acknowledged the authority of the English Church and state. Cashel is a Roman Catholic archdiocese.

Cashew' (a corruption of *acajou,* the French form of the native Brazilian name *acajaiba*), a tree (*Anacardium occidentale*) of the order *Anacardiaceæ,* common in the West Indies. It has alternate, obtuse, ovate leaves, and bears bunches of red, scented flowers. The juice of the stem is used as a varnish; and an aromatic drug is prepared by decoction and maceration of several parts of the tree, afterward consolidated by evaporation. The nut is small, kidney-shaped, ash-gray, and is seated on the end of a large fleshy receptacle. The shell consists of three layers, the outer and inner of which are hard and dry, but the intermediate layer contains a quantity of black, extremely acrid, caustic oil, which is destroyed by roasting the nuts before eating them. The oil is applied to floors in India to protect them from the attacks of white ants. A wine is made from the fleshy receptacle; and a gum with properties similar to those of gum arabic is obtained from the plant.

Cashgar, or **Kashgar,** the capital city of eastern Turkestan, in the province of Sin-Kiang or Kashgaria. It is situated on the Kizil-Daria or Kashgar River, in a position of strategic importance, 100 miles northwest of Yarkand, and comprises an old and a new town. The latter was built in 1838, is strongly garrisoned, and contains the palace of the Chinese governor. There are considerable manufactures of cotton, gold and silver cloths, carpets, etc., and an extensive trade, its position at the junction of several great routes making it the emporium of much of the commerce of central Asia. It was the capital of an independent kingdom till conquered by the Chinese during the 18th century. In 1865 it revolted but was again subdued in 1876–7. Pop. about 62,000.

Cashibo, kä shē'bō, or **Cachibo,** a savage tribe living near the Ucayale River, a tributary of the Amazon, in eastern Peru.

Cashier, To, in a military sense to dismiss from the service by annuling or withdrawing an officer's commission. It is not an official term in the United States, and is commonly construed among military men as having a more disgraceful significance than "dismissal," although there is no analogy or precedent in the use of the word by leading English authors to support this construction. Macaulay uses the term in the sense of simple dismissal or annulment of commission. Nevertheless in ordinary military parlance it means dismissal in disgrace, and its use in any other sense is regarded as unjustified.

Cash'mere, or **Kashmir,** a principality in the northwest of Hindustan, subject to a Maharajah belonging to the Sikh race, but under British protection and supervision. It is composed of various provinces or districts, of which Cashmere proper is the most famous and interesting. It is situated in the southwestern portion of the state, and largely consists of an elevated valley intersected by the Jhelum. Besides Cashmere proper, the state embraces the territory of Jamoo, Balti or Iskardo, and Ladakh and Gilghit. The whole principality thus formed is estimated to cover about 80,900 square miles, and its population in 1901 was 3,000,000. It extends from about lat. 32° to 37° N. and from about lon. 73° to 80° E. The territory of Jamoo, which forms the most populous portion of the principality, lies to the north of the Punjab, between the spurs of the Himalaya Mountains leading up to Cashmere and enclosed by the upper courses of the Chenab and Ravee. Its chief town is of the same name. Balti, also called Little Tibet, is an elevated region on the Upper Indus, to the north of Cashmere proper, lying to the southwest of the Karakorum Mountains, and having for its capital Iskardo or Skardo. Ladakh, also called Middle Tibet, lies to the southeast of Balti, between the Himalaya and Karakorum Mountains, and is also traversed by the Indus. Its passes form some of the most important media of communication for central Asia. Its capital is Leh on the Indus. Gilghit is a district on the northwest of Balti. Cashmere and Jamoo is the official title of the

whole. The principal river is the Indus, which traverses the state from southeast to northwest, and then takes a sharp turn to the southwest. The upper course of the Chenab is also in the state. Cashmere proper is a valley surrounded by gigantic mountains, belonging to the Himalayas, and traversed by the river Jhelum (formerly Hydaspes). The whole area of the enclosed region is about 4,500 square miles, and of the bottom of the valley about 2,000 square miles. From three sides only seven passes lead to this region; to the east the Himalaya presents an insurmountable barrier of snow. The splendor and sublimity of the diadem of snow-capped mountains, the beauty and richness of the hills which form the ascent to the higher peaks, it is impossible to describe. The elevated situation of the valley, and the mountains of snow which surround it, render the climate temperate; and it is, on the whole, pleasant and healthy. This region, about 5,200 feet above the sea, is watered by numerous streams, and is blessed with an abundance of the finest productions. The Asiatics therefore call it the paradise of India, the flower-garden, and the garden of eternal spring, and such names. The hills are covered with forests and Alpine pastures; at the foot of these are fields of corn; along the sides of the rivers rice is planted; rich orchards extend over the foremost ranges of hills; mulberry-trees are cultivated in abundance for the support of the silk-worms, and are entwined with vines, from whose grapes wine very similar to Madeira is prepared. The fruits of warm climates do not ripen here. The valley is famous for its flowers, with which all the gardens and meadows abound. Violets, roses, narcissuses, and innumerable European flowers, besides many that are not known in Europe, grow wild. The roses and jasmine yield the finest aromatic oils, which form an article of export. Two thirds of the inhabitants are Mohammedans, the remainder Hindus. The capital, Cashmere, is situated on the Jhelum. It is a dirty, ill-built town, extending on both sides of the river for about two miles, with few noteworthy buildings. Jamoo is the winter capital. Besides agricultural and pastoral pursuits the inhabitants carry on certain manufactures, especially woolens and artistic metal work. The manufacture of the celebrated Cashmere shawls is not so extensive as it once was, since manufactories have been established at Amritsir, in the Punjab, and elsewhere, which compete successfully with those of Cashmere. The genuine Cashmere shawls, however, are said to be of a better quality, owing to the fact that they are made of wool from the wild goat and other wild animals, this wool being, properly speaking, a soft down with which all the animals of this region are clad during the winter season. The shawls are woven in stripes, which are afterward very skilfully sewed together. Cashmere has had a varied history during the different periods distinguished as pro-Buddhistic, Buddhistic, Hindu, and Mohammedan. Buddhism, when driven from Hindustan, found a refuge in Cashmere. Mohammedanism was introduced in the 14th century. In 1586 the country was conquered by Akbar, and became part of the Mogul empire. In 1752 it was subjugated by the Afghans, under whom it remained till 1819, when it was conquered by the Sikhs. In 1846 the Sikh governor, Gholab Singh, made a separate treaty with the British, by which he acknowledged their supremacy, and agreed to lend them assistance when required. Accordingly he sent a contingent to act with the British forces against Delhi in 1857. A small annual tribute is paid to the British, partly consisting of Cashmere shawls. Under the supervision of the Indian authorities and the British resident at the court of Cashmere, great improvements in the internal condition of the state have recently been effected. The revenue system has been remodeled, and a new land revenue settlement has been completed. According to a recent blue book "An impulse has in consequence been given to agricultural pursuits, cultivation has increased, and local industries in silk culture, vineyards, wine factories, hop gardens, and orchards are being developed. . . . The posts and telegraphs in Cashmere have been taken over by the government of India, with the result of an increase in efficiency and of a saving in expense to the Cashmere state. The Cashmere troops have improved, and have shown their value in active service. Large expenditure has been incurred on public works, particularly on the improvement of the Jhelum and Gilghit roads, and on the construction in the capital, Srinagar, of water-works." A railway belonging to the Indian system now enters the country. The inhabitants are a fine race physically, tall, strong, and well built, with regular features. About two thirds of them are Mohammedans, the remainder mostly Hindus. Earthquakes frequently occur, and one that took place in 1885 caused the loss of thousands of lives.

Cashmere Goat (*Capra hircus*, var. *laniger*), a variety of the common goat remarkable for its fine downy fleece, said to be found in perfection only in Tibet, but also found elsewhere, as in Ladakh or Middle Tibet, now a province of the principality of Cashmere. It is found both in a wild state and as a domestic animal; the former is said to yield the best wool or down. The favorite food of these animals is said to be buds, aromatic plants, rue, and heath. The people of Tibet give the goats at least once a week some salt. If they are transferred from their cold mountainous abode into a warm country, the wool deteriorates. It grows very slowly in the warm part of the year, and more vigorously as the cold season approaches. The colder the region the heavier is the animal's fleece. Proper food and careful tending increase the fineness of the wool. Yearlings, as in the case with the merino sheep, afford the finest wool. A full-grown goat yields not more than eight ounces. The goats which pasture in the highest vales of Tibet have a bright ochre color. In lower grounds the color becomes of a yellowish-white, and still farther downwards, entirely white. The goats of Tibet and Cashmere have the fine curled wool close to the skin, just as the under hair of our common goat lies below the coarse upper hair. The wool is shorn in the spring, shortly before the warm season — the time when the animal in its natural state seeks thorns and hedges in order to free itself from the burden of its warm covering. A large shawl of the finest quality requires five pounds of the wool; one of the inferior quality from three to four pounds. The flesh of the Cashmere goat tastes as well as that of the common one, and its milk is as rich if it is well tended.

Casiguran Bay, kä-sē-goo'rän, an inlet on the east coast of the province of Principe, Luzon, Philippine Islands, reached through Casiguran Sound. The sound is about nine miles long from Cape Ildefonso to a narrow passage affording access to the bay. The bay itself is about three quarters of a mile long and two and a half miles wide. Its depth is some 16 to 26 fathoms.

Casimir, kăs ĭ mēr, properly **Kazimierz** ("founder of peace"), was the name of many Polish princes and kings. 1. CASIMIR I., b. 1015; d. 1058. During his minority he was under the regency of his mother and was driven from the kingdom with her. In 1041 his power was re-established, and through his efforts the predominance of Christianity was decided in Poland. 2. CASIMIR III., b. 1309; d. 5 Nov. 1370, called Casimir the Great, who succeeded his father, Vladislav Loketek, as king of Poland in 1333, was the most distinguished of this name. He added Little Russia and Red Russia to his dominions, and repelled the Tartars, who then threatened Poland. He founded the University of Cracow (1364), as well as several schools and hospitals, and showed great anxiety for the advancement of the arts and of learning in his kingdom. In 1347 he caused a new code of laws to be compiled, and protected the peasants, on which account he was called the peasants' king. He had a Jewish mistress who procured for her nation those liberties which they enjoy in Poland to the present day. With him the line of the Piasti, which had ruled in Poland for nearly 530 years, became extinct.

Casimir-Perier, Jean Paul Pierre, President of the French republic: b. Paris 8 Nov. 1847. He served in the Franco-Prussian war, and received the decoration of the Legion of Honor for bravery. In 1876 he was elected to the Chamber of Deputies; in 1890 vice-president of the chamber, and in 1893, president. He resigned to become premier, which office he held till the assassination of President Carnot, when he was chosen his successor on the first ballot (June 1894). He resigned the office of president, January 1895, and was succeeded by Félix Faure.

Casino, kȧ sē'nō, or **Monte Casino,** a celebrated Benedictine abbey in Italy, in the Neapolitan province of Caserta, near the small town of South Germano, and about 45 miles from the city of Naples, founded by St. Benedict of Norcia in 529. It is situated on a mountain, from which it derives its name, near the ruins of the ancient Casinum, and is approached by a well paved and winding road. The abbey, after having suffered repeated reverses, finally became considerable for its privileges and its wealth, and in the 11th and 12th centuries was the seat of science, particularly of medicine, the celebrated school of Salerno having been founded by the monks of Monte Casino. The church is very magnificent, although overloaded with ornament, and contains the tomb of the founder. The monastery has served as a place of refuge to several sovereigns and pontiffs, and was formerly much visited by pilgrims and travelers, who were entertained free of expense. It is still visited by travelers or tourists, but it is no longer a conventual institution, being now devoted to education. The railway from Rome now passes near it.

Casino, a name generally given to a kind of club-house or place of amusement, containing rooms for dancing, playing at billiards, etc. The word is originally Italian, being a diminutive of the Italian word *casa,* signifying a house; and was at first applied to small houses which the nobles of Florence, Venice, and other Italian cities often possessed at a distance from their ordinary residences, and which were devoted to purposes of social enjoyment.

Casiri, kä-sē'rē, **Michael,** Orientalist and Syro-Maronite clergyman: b. Tripoli, Syria, 1710; d. Madrid 1791. He studied in the College of St. Peter and St. Marcellino; and in 1734 entered the clerical profession. The following year he accompanied the learned Assemanni to Syria, where he was going, at the command of the Pope, to attend the synod of the Maronites, and in 1738 gave, at Rome, an exact account of the religous tenets of the Maronites. He afterward taught in his monastery the Arabic, Syrian, and Chaldee languages, theology and philosophy; and in the year 1748 was invited to Madrid, where he was appointed to an office in the royal library. In 1749 he devoted his attention, by the king's orders, to the library of the Escurial, of which he subsequently became the superintendent. Here he collected the materials for his celebrated work, 'Bibliotheca Arabico-Hispana,' which enumerates in 1851 articles the manuscripts of the Escurial Library, perhaps the richest in Europe in Arabic manuscripts. This work, though not entirely free from errors, contains very important information and valuable extracts, and is indispensable to every Orientalist.

Caskets, The, a group of rocks in the English Channel, seven miles from Alderney. They have often been fatal to vessels, and, in 1119, Prince William, son of Henry I., and his suite, perished here. In 1744 the Victory ship of war, of 110 guns, also was shipwrecked upon them. On the highest there is a lighthouse.

Cas'ler, John Overton, American soldier: b. Frederick County, Va., 1 Dec. 1838. He served in the Confederate army during the Civil War and was a prisoner of war from February to May 1865. He lived in Texas 1877–89, and has since been a resident of Oklahoma City, where he is justice of the peace. He is the commander of the Oklahoma division of United Confederate Veterans, and has published 'Four Years in the Stonewall Brigade' (1893); 'Lilian Stuart, the Heroine of the Rappahannock' (1889).

Casoria, kä-sō-rē'ä, Italy, a town in the province of Naples (Napoli), six miles north-northeast of Naples. It has four fine churches, and is the residence of a district judge. Silk is produced in the neighborhood. Pietro Martino, the painter, was born here. Pop. about 10,000.

Caspari, käs-pä'rē, **Karl Paul,** German Church historian: b. Dessau 8 Feb. 1814; d. 11 April 1892. He became professor of theology at Christiania in 1857. His Arabic grammar is in high repute, and his contributions to the study of the Old Testament include works on Obadiah, Isaiah, Micah, and Daniel. Besides his 'Anecdotes of Ecclesiastical History'

he published at Christiania 'The Origin of the Story of the Baptismal Symbol, and the Rule of Faith,' extensions of which appeared in 1875 and 1879.

Caspe, käs'pā, Spain, a town in the province of Zaragoza, 12 miles north-northeast of Alcañiz, left bank of the Guadalupe, near its confluence with the Ebro, on several small hills and in the intervening valleys. It has paved streets, one principal and nine smaller squares, a handsome Gothic collegiate and two other churches, several chapels, three schools, a town-hall and prison in a suppressed convent, an hospital, and several public fountains. Manufactures — wine, oil, and soap. Some trade is also carried on in grain and cattle. Pop. 8,427.

Cas'pian Gates, a name given to the Russian fortress Dariel, situated in a narrow defile of the Caucasus, on the Terek, 80 miles north of Tiflis.

Caspian Sea, a large lake or inland sea between Europe and Asia, now nearly surrounded by Russian territory but having Persia on the south; 730 miles in length from north to south, and from 130 to 270 in breadth; area about 170,000 square miles; the largest isolated sheet of water on the globe. The water is less salt than that of the ocean, of a bitter taste, and of an ochre color, without ebb or flow. In some places it is exceedingly deep, yet it abounds in shallows, so as to prevent the navigation of ships which draw more than 9 or 10 feet of water. The level of the Caspian Sea is considerably lower than that of the ocean. Among the rivers which flow into it are the Volga, Ural, Terek, and Kur. In ancient times the Oxus (Amoo Daria) also flowed into it. It has no outlet. The fisheries here, which are very valuable, occupy and train many seamen. Sturgeons and sterlets are caught in great quantities, and there are also salmon-trout, perch, *Silurus glanis,* two kinds of carp, and porpoises; seals abound in the upper coasts, and tortoises between the mouths of the Volga and the Ural. In the northern region the first fishing season, called the caviar season, occurs between March and May, when the Volga, Ural, etc., are getting cleared of ice. The second season is in July, when the sturgeon descend the rivers; and the third or open-sea fishing goes on from September to November. The only ports at all worthy the name on or near the Caspian are Astrakhan, Baku, Derbend, and Astrabad (in Persia). The navigation is at all times difficult and often perilous. Steam packets are now established on this sea. The Russians have also a fleet of war vessels in the Caspian, and a new naval station has been established at Krasnovodsk, on the east side of the sea. By means of river and canal there is water communication between the Caspian and the Black Sea, Baltic, and White Sea.

Cass, Lewis, American statesman, diplomatist, and soldier: b. Exeter, N. H., 9 Oct. 1782; d. Detroit, Mich., 17 June 1866. In 1800 he removed to Marietta, Ohio, where he entered on the study of the law. He was admitted to the bar in December 1802, and soon after established himself at Zanesville, where he gradually acquired practice. In 1806 he was elected to the Ohio legislature. He served in the first year of the second war with England and in 1813 was appointed governor of Michigan Territory, holding office till July 1831. Michigan at this time had no territorial legislature, and the business of selecting laws for it from the codes of the States devolved on Governor Cass and the territorial judges. Governor Cass was also *ex officio* superintendent of Indian affairs for the territory, which then included what now constitutes the two States of Michigan and Wisconsin, and this remained for several years the most important part of his duties. Of all this extensive territory, it was only a little tract bordering on Lake Erie and the Detroit River to which the Indian title had yet been extinguished. Within the bounds of his Indian superintendency, ultimately made to embrace all the tribes northwest of the Ohio, there were reckoned to be 40,000 Indians, mustering at least 9,000 warriors. The recent hostilities, and the distrust and suspicions of the Indians, occasioned by the constant calls upon them for additional cessions of land, rendered this office one of great delicacy and difficulty. But Governor Cass, while steadily carrying out the policy of acquisition, succeeded also in maintaining the respect, and even in securing the affection of the Indians. In 1817 he obtained, in conjunction with Governor McArthur, a cession of most of the remaining Indian lands within the state of Ohio, with adjoining tracts in Indiana and Michigan, to the extent of 4,000,000 acres in the whole. This cession removed the Indian barrier hitherto intervening between the settlements of Ohio and those of Michigan. In 1819 he met the Chippewas at Saginaw, and obtained a cession of lands in the peninsula of Michigan to the extent of 6,000,000 acres. As yet the northwestern regions were very imperfectly known. At the suggestion of Governor Cass, an expedition, in which he himself bore a conspicuous part, and of which an account has been published by Schoolcraft, was set on foot in 1820, for exploring the northern shore of Lake Superior, and the course of the upper Mississippi. The next year, by a long, circuitous river navigation, he visited Chicago, then nothing but a military post, with a wide wilderness all about it, and there made a treaty with the Chippewas, Ottawas, and Potawatamies, by which a large additional tract was obtained, completing the extinction of the Indian title to the peninsula of Michigan south of Grand river. In 1828 he made two treaties, one at Green Bay, the other at St. Joseph's, by which many millions of acres were ceded to the United States. Up to his resignation of the office of governor of Michigan, in July, 1831, he had concluded 19 treaties with the Indians, by which cessions had been acquired in Ohio, Indiana, Illinois, Michigan, and Wisconsin, to an amount equal to nearly or quite a fourth part of the entire area of those states. When President Jackson reconstructed his cabinet in August, 1831, Cass was appointed Secretary of War. The policy of the removal of the Indians, especially the southern tribes, to districts west of the Mississippi, had been warmly espoused by Gen. Jackson. The defense of this policy, which had elicited much criticism and a warm opposition, was ably entered upon by Secretary Cass in his first annual report. In 1836 he was appointed minister to France, a post which he held till 1842. He was on excellent terms with Louis Philippe, of whose character he gave a very friendly and favorable account in his 'King, Court, and Gov-

ernment of France,' published in 1840, originally as an article in the 'Democratic Review.' By far the most remarkable incident of his diplomatic career occurred just at its close, in his attack on the quintuple treaty for the suppression of the slave trade. He was United States Senator (1845–8), and having opposed the Wilmot Proviso, became the Democratic candidate for President in 1848, but was defeated. He returned to the Senate in 1849, and was secretary of state (1857–60), resigning because President Buchanan would not consent to strengthen the garrison at Fort Sumter. He wrote: 'History, Traditions, and Languages of the Indians' 1823; 'France, Its King, Court, and Government.' See 'Lives' by Schoolcraft (1848); Smith (1856); McLaughlin (1891).

Cassagnac, Adolphe Bernard Granier de, ăd-ŏlf bär-när grä-nē-ā dė käs sän yäc, French journalist and politician: b. 1806; d. 31. Jan. 1880. He began his career at Paris as contributor of literary criticisms to the *Journal des Débats,* and soon made himself known, and latterly notorious, as editor of various papers, the *Globe,* the *Pouvoir,* the *Pays,* etc., and as being involved in many controversies and duels. He published various books, chiefly historical. Among the principal are: 'Portraits Littéraires'; 'Histoire des Causes de la Révolution Française'; 'Histoire des Girondins'; 'L'Empereur et la Démocratie Moderne.'

Cassagnac, Paul-Adolphe Marie Prosper (pōl ăd-ŏlf mä-rē prōs păr) **Granier de,** son of Adolphe; had a career and a reputation not dissimilar to those of his father. He was born 2 Dec. 1842. He was taken prisoner at Sedan in 1871, and underwent eight months' confinement in Silesia. His violent advocacy of Bonapartism led him into innumerable duels, and he was on several occasions summoned for libelous articles in the *Pays* and other newspapers. He was a vigorous supporter of Gen. Boulanger, but his violence in later years somewhat abated. Since 1884 he has edited a journal known as *L'Autorité.* He has written a 'Histoire de la Troisième République' (1875); 'Empire et Royanti'; 'Memoires de Chislehurst.'

Cassan'der, king of Macedon, son of Antipater: b. about 354 B.C.; d. 297 B.C. He disputed the sovereignty of Macedon with Polysperchon, whom Antipater had appointed regent at his death in 319 B.C. Allying himself with Ptolemy and Antigonus, he conquered Athens; captured Olympias, the mother of Alexander the Great, and put her to death; and connected himself with the royal family by marrying Thessalonica, half-sister to Alexander. He joined, in 315 B.C., the coalition against the growing power of Antigonus; murdered the rightful heir to the throne, Alexander Ægus, and his mother Roxana; and took the title of king in 306 B.C., which was confirmed to him by the decisive battle of Ipsus in 301 B.C.

Cassan'dra, also **Alexandra,** daughter of Priam and Hecuba, and twin-sister of Helenus. Both children, according to tradition, were playing in the vestibule of the temple of the Thymbræan Apollo, not far from Ilium; and having stayed there too late to be carried home, a couch of laurel twigs was prepared for them, for the night, in the temple. When the nurses went to them the next morning they found two serpents at the side of the children, which, instead of injuring them, harmlessly licked their ears. This miracle produced a still greater one: the hearing of the children was rendered so acute that they could distinguish the voices of the gods. Cassandra subsequently spent much of her time in the temple of Apollo, who, becoming enamored of her charms, disclosed to her all the secrets of the prophetic art, and in return demanded her love. But Cassandra, when her curiosity was satisfied, refused the dishonorable reward. Apollo, incensed at this, solemnly decreed that her prophecies should never find belief. She frequently and continually foretold the destruction of Troy, and warned her countrymen in vain against the deceitful horse. When Troy was conquered, and Cassandra, with the other maidens, fled to the temple of Minerva, Ajax, son of Oïleus, tore her from the altar, deflowered the virgin in the sacred place, and dragged her away to the other female slaves, with her hands tied. On the division of the booty she fell to Agamemnon, who carried her as his slave and mistress to Mycenæ. Clytæmnestra murdered them both. Agamemnon had twins by her — Teledamus and Pelops, who were put to death by Ægisthus. The ancients regarded this rape of Cassandra as a most infamous atrocity. It has often afforded a subject to poets and sculptors. The Locrians, the countrymen of Ajax, were afflicted on this account for many years with storms, and their country was desolated with the plague.

Cassandra, the most westerly of the three tongues of the Chalcidic peninsula, between the gulfs of Salonica and Cassandra. Its ancient name was Pallene. The Gulf of Cassandra was anciently Toronaicus Sinus.

Cassano d'Adda, käs-sä'nō dăd'dä, Italy, a town in the province of Milan, and 16 miles north-northeast of the town of Milan, pleasantly situated on a hill on the right bank of the Adda. It is very old, and built mostly of bricks. A bridge of 800 paces connects it with the opposite bank of the river. There are numerous silk-mills. Its military position on the right bank of the Adda has caused it to be the scene of several battles. Here Ezzelino da Romano, the leader of the Ghibellines in Italy, in the time of the Emperor Frederick II., was defeated in 1259; here also Prince Eugene was defeated in 1705, by the Duke de Vendôme, and the French under Moreau, by Suwarow in 1799. Pop. of commune about 10,000.

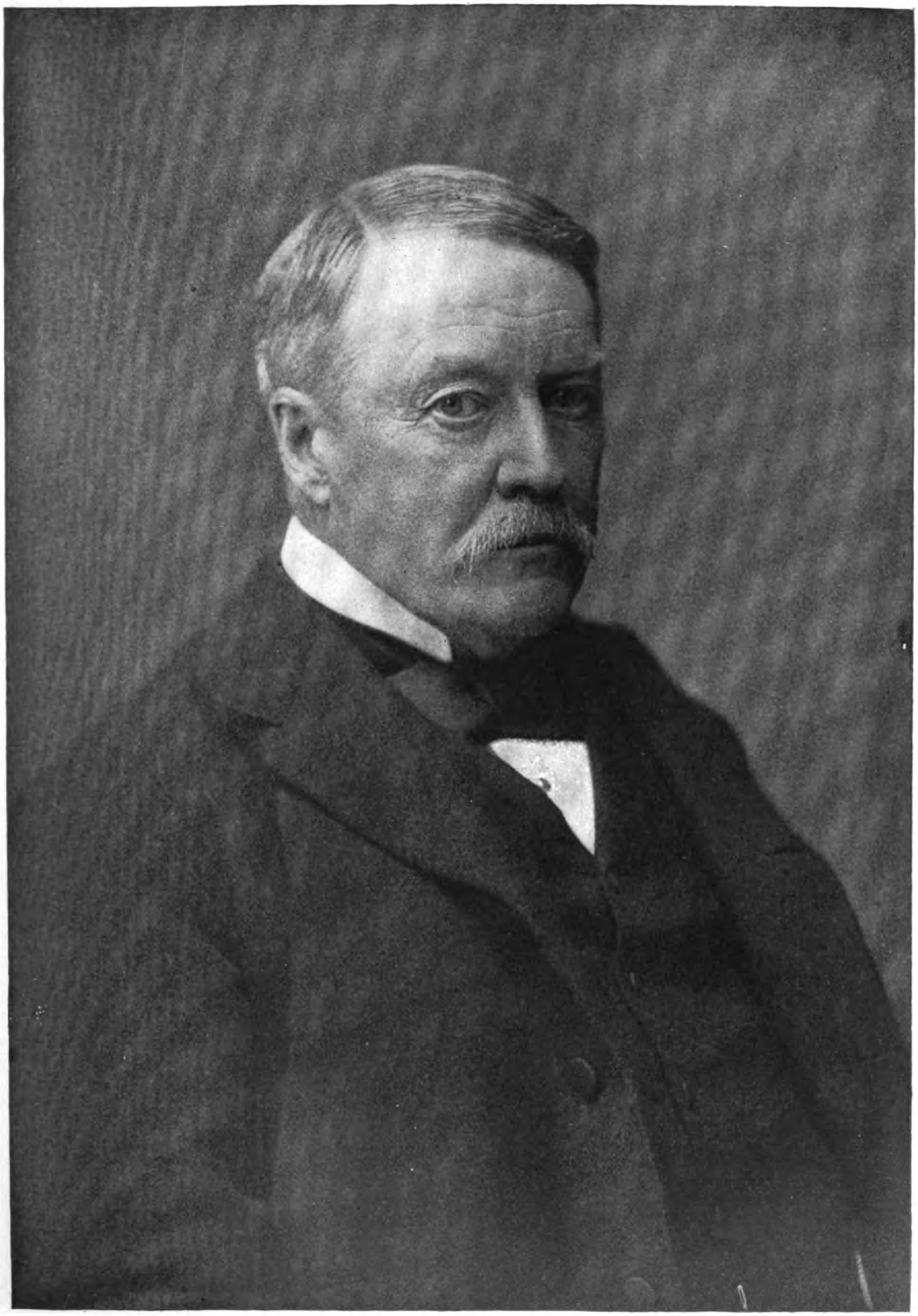
Cassareep, kăs'sa-rēp, **Cassireepe,** or **Cassiripe,** the concentrated juice of the roots of the common or bitter cassava (*Manihot utilissima*), flavored by aromatics, and deprived of its poisonous properties by boiling. It is used to give a relish to soups and other dishes, and forms the basis of the West Indian "pepperpot." It is a powerful antiseptic, and is very useful in keeping meat fresh in a tropical climate.

Cassas, Louis François, loo-ē frăn-swä käs-sä, French landscape-painter and architect: b. Azay-le-Ferron, 1756; d. 1827. He went to Italy when very young, and carried with him a collection of views from nature, which he afterward enlarged by others taken in Sicily, Istria, and Dalmatia. He next accompanied the Count of Choiseul Gouffier, ambassador to Constantinople, compared the topography of Troy with the accounts given of it by the ancients, took drawings of the remains and the surround-

ing country, and traveled through Asia Minor, Syria, Palestine, and part of Egypt. On his return he was appointed inspector and professor of design at the Gobelins in Paris. The models which he had made of the most celebrated architectural works of different countries were purchased by Napoleon, who rewarded him with a pension, and caused them to be placed in the Parisian School of Arts. From the materials collected in his travels have been compiled 'Voyage Pittoresque de la Syrie, de la Phénicie, de la Palestine, et de la Basse Égypte' (1799), and 'Voyage Historique et Pittoresque de l'Istrie et de la Dalmatie' (1802, with sixty-nine copper plates). The original drawings for both works were admirable oil paintings, and they were deposited in the Bibliothèque Royale. Cassas was invested with several orders of knighthood.

Cassation, a term used in the courts on the Continent of Europe. It is derived from the Middle Ages, and signifies the annulling of any act or decision if the forms prescribed by law have been neglected, or if anything is contained in it contrary to law.

Cassation, Court of (*Cour de Cassation*), one of the most important institutions of modern France, which gives to the whole jurisdiction of that country coherency and uniformity without endangering the necessary independence of the courts. It was established by the first National Assembly, and has been preserved, in every essential respect, under all the changes of the Revolution and Restoration. It has been maintained even in those districts which, by their union with France became subjected to French laws, but by the Peace of Paris again became part of the Prussian monarchy. In France, as early as the reign of Louis IX. (1226–70), petitions were presented to the king by appellants from the decisions of the courts. In later times appeals to the parliaments, as the highest courts of the kingdom, came into use, and their decisions were not liable to be set aside by the ordinary forms of law. Yet the parties were allowed to dispute even these decisions if they were founded upon errors of fact or violated undisputed principles of law; and by an ordinance of 1302 it was provided that the parties should be allowed royal letters for the defense of their rights against the decisions of the supreme courts (*lettres de grâce de dire contre les arrêts*), which should be issued from the chancery (by the chancellor of France). The case was then sent back to the parliament for further investigation, but was examined and decided in the presence of the king himself, or of a special commissioner. An abuse, however, crept in of transferring these cases to the royal council, where they were decided by officers called *maîtres des requêtes.* These letters received the name of *lettres de proposition d'erreur,* and during the civil commotions at the end of the 14th century began to be more frequently presented to the council, which, as soon as one party complained of the partiality of the parliaments, transferred the case to its own bar, and obstructed the course of justice by *lettres d'état* suspensions of the process, on the pretext of the absence of one of the parties in the service of the king). Under the Chancellor Poyet (1538–42), this abuse reached its highest pitch; but the Chancellors Olivier (1545–51), and Hôpital (1560–8), the two great reformers of French jurisprudence, limited the use of these *lettres* till, by the Ordinance of Blois (1576), all the provisions against the decisions of the parliaments were reduced to these three: — the *proposition d'erreur,* for an error of fact; *requête civile,* to restore the parties to their former condition on account of the fraud of one of the parties or the mistakes of the attorney; and *cassation* (petition for abrogation), for violation of forms or settled principles of law. By the famous Order of Procedure of 1667 the first of these provisions was abolished, but the province of the *requête civile* and *cassation* was enlarged and more precisely defined. The former was always brought before the court itself and decided there, the latter before the council. For this purpose, in the *conseil privé,* or *conseil des parties,* a particular committee was formed, consisting of the chancellor, the four secretaries of state (ministers of the departments), the council of state, and all the *maîtres des requêtes* (in 1789, 78 in number). The decisions of this committee were too much influenced by the will of the king and the ministers, and by various other circumstances, so that they did not enjoy great respect, though they often exposed acts of great injustice on the part of the parliament and other high courts. It was therefore abolished in the first National Assembly, and its place supplied by an independent court — the *tribunal de cassation* (decrees of 27 Nov. and 1 Dec. 1790), which was retained in all the constitutions and received under the imperial government (1804) the name *cour de cassation,* which it still retains. It consisted, according to the organization of 1800, of 48 members, chosen from the senate, on the nomination of the consuls, who elected their own president from among themselves. The appointment of president was afterward vested in the emperor. In the *Charte Constitutionelle* of 1814 the number of members of the *court de cassation* was fixed at 49, at which it still remains. The members are appointed for life by the president of the republic, and consist of a first president, three presidents of sections, and 45 councilors, besides certain honorary members. The minister of justice, or keeper of the seals (*garde des sceaux*) has the right of presiding on certain occasions. This court never decides on the main question at issue, but on the competency of the other courts and on the petitions to have their decisions reviewed or annulled, and assigns the question to another court if a decision is to be set aside for an evident violation of the forms or the principles of the law. For this purpose it is divided into three sections or chambers: — the *chambre des requêtes,* which decides on the admissibility of the petitions in civil cases; the *chambre de cassation civile;* and the *chambre de cassation criminelle.* After a decision has been reversed, if a second court decides the same case in the same way, and an appeal is entered again, the court of cassation must either request an authentic explanation of the law from the government, or at least all the three sections must unite, to pronounce a second reversal or cassation; and if a third decision is the same as the preceding, the court before which the case is again brought must submit to the doctrine of the court of cassation on the point of law in dispute. This system, which dates from 2 April 1837, gives great authority to this court



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Mail

in matters of jurisprudence. According to the law in force before 1837, the court before which a case was brought for decision a third time was not required to adopt the views of the court of cassation, but after the third decision there was no further appeal. The government, however, in that case gave an authentic interpretation of the law if there was any occasion for so doing. Until the end of 1852 there was a similar court of cassation for the Prussian province of the Rhine, but in 1853 its jurisdiction was transferred to the supreme Prussian tribunal sitting at Berlin. The sentences of the court of cassation are not only recorded in the journals of the courts, the decisions of which are reversed, but published likewise in an official bulletin, by which consistency and uniformity are preserved. The tribunal of cassation has enjoyed from its commencement the respect and confidence of France, and has numbered among its members several of the most distinguished lawyers; as the President Henrion de Fansey, the councilors, Chabot, Merlin, and Carnot.

Cassatt', Alexander Johnston, American railway president: b. Pittsburg, Pa., 8 Dec. 1839. He was educated in the University of Heidelberg, and the Rensselaer Institute, Troy, N. Y., and in 1859 was employed as civil engineer in surveying a railroad route in Georgia. He entered the service of the Pennsylvania Railroad as rodman in 1861, became general superintendent of the Pennsylvania system and general manager of the lines east of Pittsburg, 1871-4; third vice-president, 1874; and first vice-president, 1880. He resigned this last-named post in 1882, but was elected a director in 1883, and in June 1899 was elected president of the Pennsylvania system. He is at present the president of seven companies, and a director in 23, including transportation, banks, and trust companies.

Cassatt, Mary, American artist b. Pittsburg, Pa., about 1855. In 1875 she went to Europe to study art, and lived for some years in Spain, where she gave particular attention to the works of Velasquez. Removing to Paris, she was influenced by the work of Manet and Legas, and exhibited in the Impressionist Exposition about 1880. In 1898 she exhibited some of her works in New York city. Returning to Europe, she established a studio in Paris, where she has since lived. She has gained considerable fame as an etcher, ranking among the first of the modern artists in this medium.

Cassava, kăs-sä'va, **Manioc,** măn'ĭ-ŏk, or **Mandioc,** a South American shrub (*Manihot utilissima*) belonging to the natural order *Euphorbiaceæ*, sub-order *Crotoneæ*. There are two forms, popularly known as bitter and sweet, both of which are widely cultivated in tropical America for their fleshy, cylindrical, starchy roots, which form a large part of the food of the natives, and from which tapioca is made. They have also been introduced into other warm countries, especially Africa, and have quickly gained important positions as food crops.

The plant, which attains a height and breadth of four feet or more, is rather bushy, since its numerous knotty, brittle, pithy stems have many palmate leaves. The flowers, which appear in midsummer, are green or yellowish and inconspicuous, and are succeeded by wing-angled capsules. The best results are obtained on light, sandy, well-drained soils. The land is prepared as for corn, but instead of planting seed, stem cuttings are covered by the plow, and when the plants appear they are cultivated with the same implements used in corn-growing. In about seven months the white soft roots, which occasionally weigh 30 pounds, and are sometimes three feet long and three inches thick, are dug by hand, washed, grated, or ground to pulp. The juice, or poisonous part, is carefully pressed out, and when boiled, becomes the delicious sauce called cassar, much esteemed by epicures. The flour that remains after pressure is formed into thin, round cakes, and baked. To a European accustomed to eat bread, these, though sweetish and not unpalatable, have an insipid taste. If placed in close vessels, and preserved from the attacks of insects, cassava bread may be kept for several months without injury.

Poisoning by the bitter cassava is due to the presence of minute quantities of hydrocyanic acid. This is a very common ingredient of many fruits and seeds, but usually is modified as the fruit ripens. The general process of manufacture of cassava destroys or drives off the free hydrocyanic acid. The symptoms of this poison are very acute. Death is very sudden from paralysis of the heart and respiratory centres. Non-fatal poisoning is accompanied with great prostration, nausea, vomiting, and collapse. There are no efficient antidotes.

The natives of South America throw a number of cakes of cassava together to heat, after which they soak them in water, which causes a rapid fermentation to take place; and from the liquor thus obtained they make a very sharp and disagreeable, but intoxicating beverage, which will not keep longer than 24 hours without spoiling.

From the pure flour of cassava is formed the substance called tapioca, which is frequently used for jelly, puddings, and other culinary purposes. This is separated from the fibrous parts of the roots by taking a small quantity of the pulp after the juice is extracted and working it in the hand till a thick, white cream appears on the surface. This, being scraped off and washed in water, gradually subsides to the bottom. After the water is poured off the remaining moisture is dissipated by a slow fire, the substance being constantly stirred, until at length it forms into grains about the size of sago. These become hard by keeping, and are the purest and most wholesome part of the cassava.

The roots of another species of this shrub, called sweet cassava (*Manihot aipi*), the juice of which is not poisonous, are usually eaten with butter, after being roasted in hot ashes. They have much the flavor of chestnuts, and are an agreeable and nutritive food, containing about 30 per cent of carbohydrate materials. The roots of the sweet cassava are also used as stock-food and to make glucose and starch. Florida is the only State in which sweet cassava has attracted much attention, but it seems to be not very profitable there on account of the high price of labor and fertilizers.

Cassegranian Telescope, a form of the reflecting-telescope in which the great speculum is perforated like the Gregorian, but the rays converging from the surface of the mirror are

reflected back by a small convex mirror in the axis of the telescope, and come to a focus at a point near the aperture in the speculum, where they form an inverted image, which is viewed by the eyepiece screwed into the tube behind the speculum.

Cassel, käs'sĕl, or **Kassel,** formerly the residence of the Elector of Hesse-Cassel, and now the chief town in the Prussian province of Hessen-Nassau, lies on the Fulda, 91 miles north-northeast of Frankfort-on-the-Main. It is divided into the Altstadt, or Old Town; the Ober Neustadt, or Upper New Town; the Unter Neustadt, or Lower New Town; and the new West Quarter; all but the third being on the left bank of the river. Cassel has several fine squares, or open areas, on the principal of which, the Friedrichsplatz, stands the electoral palace, an indifferent structure; and next to it the museum, a handsome building, containing a library of 170,000 volumes, and many valuable MSS. At one end of this area is a handsome triumphal arch and war monument overlooking the Fulda valley, in which is the Karlsaue, finely laid out, and forming a favorite promenade. On this side of the city are also the building for the courts and government offices, the Bellevue palace containing the academy of arts, and the handsome picture-gallery containing some fine examples of the old masters, especially the Flemish and Dutch. The other more noticeable public areas are the Königsplatz, in the form of a circle; the Friedrich-Wilhelmsplatz, with an ornamental fountain; the Ständeplatz, a broad tree-planted avenue, etc. The most noteworthy church is the Protestant church of St. Martin, with a nave of the 14th and a choir of the 15th century. An observatory is likewise situated here. Cassel has iron-foundries and machine-shops, works for railway-carriages, mathematical instruments, pianos, gloves, jute works, etc. In the vicinity is Wilhelmshöhe, the ex-elector's summer palace, the temporary residence of Napoleon III. after Sedan. Pop. (1901) about 107,000.

Cas'sia, a genus of leguminous plants, of the tribe *Cæsalpineæ,* inhabiting the tropical parts of the world, consisting of trees, shrubs, or herbs, the leaflets of several species of which constitute the well-known drug called senna. That imported from Alexandria is obtained from *C. acutifolia* and *C. obovata. C. fistula* is found wild in India. Its legumes contain a quantity of thick pulp, which is a mild laxative and cathartic, and enters into the composition of the confection of cassia and the confection of senna. It belongs to the sugar class of laxatives, its properties being due for the most part to the water-attracting properties of sugar while in the intestinal canal. The leaves and flowers are also purgative. The bark and roots of several of the Indian species are much used in medicine. "Cassia bark" is a common name for the bark of an entirely different plant, *Cinnamomum cassia,* belonging to the laurel family. It is much imported into Europe, mostly from China, and is also called *Cassia lignea.* Its flavor somewhat resembles that of cinnamon, and as it is cheaper it is often substituted for it, but more particularly for the preparation of what is called oil of cinnamon. The cassia of the Bible was probably cassia bark. Cassia buds, which are similar in flavor, are the unripened fruits of this tree.

Cassia'nus, otherwise called JOANNES MASSILIENSIS and JOANNES EREMITA, early theological writer and zealous advocate of the monastic system, who flourished in the early part of the 5th century, but so little is known of the time and place of his birth that it is still doubtful whether he was a Scythian, Greek, or Roman. It is certain, however, that he traveled extensively in the East, and was long a pupil and deacon of Chrysostom. When the latter, through the intrigues of his opponents, was removed from the episcopal chair, Cassianus was sent with Germanus to Rome to present a memorial from the clergy who adhered to Chrysostom. Here he became personally acquainted with Pelagius. About 415 he went to Marseilles, where he continued a course of restless activity as a presbyter till his death, which took place some time between 430 and 450. He founded two monasteries on the principles laid down by him in his works 'De Institutis Cœnobiorum' and 'Collationes Patrum Sceticorum' (that is, 'Conferences of the Monks in the Desert of Sketis'). The views advanced in these works, and still more the strong leaning which he showed to the dogmas of Pelagius, involved him in a controversy with Augustine. He ultimately modified his opinions so far as to adopt the system to which theologians have given the name of Semi-pelagianism, holding that man, since the fall, is not absolutely incapable of good, but, on the contrary, both derives from nature the seeds of virtue, and is able of himself to commence their primary development, though he requires the aid of divine grace to bring them to maturity. These views found great favor with the monks of France, and long maintained their ground in opposition to the efforts of Augustine and his friend Prosper of Aquitania. The best edition of the works of Cassianus is that of Frankfort (1722, fol.).

Cas'sin, John, American ornithologist: b. near Chester, Pa., 6 Sept. 1813; d. Philadelphia 10 Jan. 1869. He resided in Philadelphia from 1834, and excepting a few years partially given to mercantile pursuits, devoted himself to the study of ornithology. He contributed descriptions of new species and synoptical reviews of various families to the 'Proceedings' and the 'Journal' of the Philadelphia academy of natural science; and his more elaborate publications are 'Birds of California and Texas,' containing descriptions and colored engravings of 50 species not given by Audubon; 'Mammalogy and Ornithology of the Wikes Exploring Expedition'; 'Ornithology of the Japan Expedition'; 'Ornithology of Gilliss's Astronomical Expedition to Chile'; and the chapters on rapacious and wading birds in the 'Ornithology of the Pacific Railroad Explorations and Surveys.' His works are the result of careful research, and are especially valuable for their descriptions and classification of many birds not given in the previous works of Wilson and Audubon. According to Coues he was the only American ornithologist as familiar with the birds of the Old World as with those of America.

Cassini, Giovanni Domenico, jō vän'nē dō-mē'nē-cō käs-sē'nē, Italian astronomer: b. Perinaldo, near Nice, 8 June 1625; d. Paris 14 Sept. 1712. He studied at Genoa with the Jesuits. Chance turned his attention to astronomy, in which he made such rapid progress that

in 1650 the senate of Bologna bestowed on him the first professorship of astronomy at the university. A meridian had been drawn by Ignatio Dante (1575) in the church of St. Petronia in that city. In 1653 Cassini conceived the idea of extending and correcting it. In two years he completed this difficult task, the first-fruits of which were more correct tables of the sun, a more precise determination of its parallax, and an excellent table of refractions. By an observation at Città della Piave he discovered the shadows cast by the satellites of Jupiter on the disk of that planet when they are between it and the sun. By means of these he corrected his theory of the motion of the satellites, and determined the period of Jupiter's revolution. In 1668 he published his 'Ephemerides of the Satellites of Jupiter.' In 1673 he settled in France. He discovered four new satellites of Saturn and the zodiacal light, proved that the axis of the moon is not perpendicular to the plane of the ecliptic, and showed the causes of her libration. The laws of this motion are one of his finest discoveries. He also wrote observations on the Indian calendar. The meridian commenced by Picard and Lahire was continued by Cassini in 1700 to the extreme limits of Roussillon, and when measured 100 years later showed a difference of only 21 toises (about 134 feet). He lost his sight some years before his death. His 'Opera Astronomica' was published at Rome in 1666.

Cassini, Jacques, zhäk, French astronomer: b. Paris 18 Feb. 1677; d. Thury, department of Oisi, 16 April 1756. He was the son of Giovanni Domenico and succeeded him in his post at the Paris observatory. In 1694 he was admitted into the Academy of Sciences. His labors to determine the figure of the earth are well known. The first measurement of 1718 made the degrees of the meridian shorter toward the north than toward the south, whence it was concluded that the earth was an oblong spheroid. Cassini continued the measurement, and maintained this opinion in his work 'De la Grandeur et de la Figure de la Terre.' In order to settle the question the Academy was commissioned in 1733 to measure the whole length of France from Brest to Strasburg. Cassini directed this undertaking, but was led into some errors by the defective instruments of former observers. The astronomical tables which he compiled were published at Paris in 1740. He wrote a great work on the inclinations of the orbits of Saturn's satellites and ring. In addition to his astronomical works, he wrote several essays on subjects in natural philosophy, etc.

Cassini, Jacques Dominique, zhäk dō-mē-nēk, COUNT DE, French astronomer: b. Paris 30 June 1748; d. Paris (?) 18 Oct. 1845. He was the son of Cassini de Thury and succeeded his father in 1784 as director of the Paris observatory. He was a member of the Academy, and a statesman of ability as well as a mathematician. In 1789 he completed the topographical work which was begun by his father. The 'Atlas National' was a reduction of it on a scale of one third. Cassini was arrested by order of the revolutionary tribunal. He escaped with life, but lost the copper-plates of the 'Carte de France,' which had cost 500,000 francs. Napoleon made him a count of the empire.

Cassini de Thury, de tü-rē, **César François,** sā-zär fräṅ-swä, French astronomer: b. Paris 17 June 1714; d. 4 Sept. 1784; son of Jacques Cassini. He was a member of the Academy from his 22d year, and director of the observatory in 1756. He undertook a geometrical survey of the whole of France. When the support of the government was withdrawn in 1756, Cassini formed a society for advancing the requisite sums, which were to be repaid by the sale of the maps constructed from the survey. The work was almost entirely finished when he died.

Cassinian, or **Cassian Oval,** a special cartesian oval. It is the locus of a point the product of whose distances from two fixed points is constant. It varies in shape as the constant product and the distance between the fixed points are differently chosen, and may break up into two separate, but symmetrical figures. Another special form is that of Bernouilli's lemniscate.

Cassino, a game at cards usually played by four persons (although more can enter the game), two on each side. In it the ten of diamonds, technically called big cassino, counts two; and little cassino, the two of spades, counts one. The points possible to be scored in one deal (exclusive of sweeps) number 9. They are: Big cassino, 2; little cassino, 1; cards, 1; spades, 1; each ace, 1 = 4. A sweep is counted when a player takes up all the cards on the table. The object sought in the game (besides the points already enumerated) is to arrange the cards on the board in combination so that the sum of the spots on the cards thus combined may equal those on one card in the hand of the player, who has the right to take as many cards from the board as he can thus combine; or he may capture any card from the board the counterpart of which he has in hand.

Cassiodo'rus, Magnus Aurelius, Roman historian and statesman, who lived from about 468 to 568. He entered the service of the Ostrogoth king of Italy, Odoacer, at the age of about 20 years and under him and his successor Theodoric was treasurer of the kingdom and trusted councilor, administering his office with extraordinary prudence in a most difficult time. As statesman, scholar, and historian he kept alive the lamp of the Græco-Roman learning after the overwhelming of the ancient civilization by the barbarians. After a term of 50 years in public station he withdrew to a monastic institution founded by himself in his native province Bruttium and there spent the remaining 30 years of his useful life, imbuing his monks with a love of the ancient learning and employing them in copying the ancient texts of profane no less than of religious writings. He may be regarded as the father of the monastic *Scriptorium* to which modern learning is indebted for great part of what has come down to us of the ancient literature and of the history of the west in those troublous times. He composed manuals of rhetoric and grammar which were used as text-books in the schools of the Middle Ages till the revival of the ancient learning, and which inspired men with a longing for the ancient knowledge. Of great service also were his works 'De Artibus ac Disciplinis Liberalium Literarum' (of the liberal arts and courses of study), and his 'De Institutione Divinarum Literarum' (instruction in scriptural know-

ledge); but above all his 12 books of 'Epistolæ Variæ' (various letters), containing decrees of the Ostrogothic kings, upon which is based the whole history of Italy under the rule of those barbarian potentates: this collection was first printed at Augsburg 1533. With one Epiphanius he made a compendious Latin version, entitled 'Tripartita Historia' (tripartite history) of the history of the Church as written by the three Greek historians, Socrates, Sozomen, and Theodoret, and continued Socrates' history to the year 518. An edition of his complete works was printed at Rouen in 1679 and at Venice in 1729. His 'Life' was written by the eminent Benedictine, Sainte Marthe, and published in Paris in 1694.

Cassiopeia, kăs-ĭ-ō-pē'ya, in Greek mythology, daughter of Arabus and wife of Cepheus, to whom she bore Andromeda. She dared to compare her daughter's beauty to that of the Nereids, who, enraged thereat, besought Poseidon for vengeance. The god, in compliance with the request of the water-nymphs, laid waste the dominions of Cepheus by means of a deluge and a dreadful sea-monster.

In astronomy Cassiopeia is a conspicuous constellation in the northern hemisphere, situated next to Cepheus. In 1572 a new and brilliant star appeared in it, which, however, after a short time, gradually diminished, and at last disappeared entirely. The constellation Cassiopeia contains 55 stars, five of which, arranged in the form of a W, are of the third magnitude.

Cassiquiari, kăs-sē-kē-ä'rē, or **Cassiquiare,** a deep rapid river of South America, in Venezuela, branching off from the Orinoco, and forming a water-way by which that river has navigable communication with the Rio Negro. It leaves the Orinoco in lat. 3° 10′ N.; lon. 66° 20′ W., about 20 miles west of Esmeralda, and, after a southwest course of 128 miles, falls into the Rio Negro near San Carlos, in lat. 2° 5′ N.; lon. 67° 40′ W. It is estimated to carry off about a third of the water of the Orinoco, being 100 yards broad where it leaves that river, and about 600 yards at its junction with the Rio Negro. By means of this river, the Rio Negro, the Amazon and its tributaries, it is practicable to sail from the interior of Brazil to the mouth of the Orinoco.

Cassiterides, kăs-sĭ-tĕr'ĭ-dēz, a name derived from the Greek *kassiteros,* tin, and anciently applied, but with no uniformity or precision, to the tin district of Cornwall, to the Scilly Isles, or to small islands off the northwest coast of Spain.

Cassit'erite, native dioxide of tin, SnO_2, crystallizing in the tetragonal system, and also occurring uniform and in rolled grains. The crystals are usually brown or black, brittle with an uneven fracture, and with a specific gravity of from 6.8 to 7.1, and a hardness of from 6 to 7. Ordinary massive or crystallized cassiterite is often called "tinstone," especially in England; "wood tin" is a botryoidal form, "stream tin" is the mineral in small rolled pebbles found in the streams or placer deposits and is formed by the disintegration of stanniferous rocks. Cassiterite is the most important ore of tin. It occurs in Cornwall (England), Saxony, Bohemia, Galicia, Greenland, Sweden, and in Australia, the Malay Peninsula, Banca, Bolivia, and Mexico. In the United States it is found in small amounts in various States, and it has been mined to some extent in Virginia and in South Dakota. A promising deposit has recently been reported from San Bernardino County, Cal., where mining operations have been carried on for some time with apparent success.

Cassius, kăsh'ŭs, **Andreas,** Dutch physician who flourished during the 17th century. He graduated at Leyden in 1632, was physician to the Duke of Holstein and Bishop of Lübeck, and died at Hamburg in 1673. His name is best known in connection with a purple color obtained from gold, which was briefly described in a treatise published by his son in 1685.

Cassius Longi'nus, Caius, the friend of Brutus, was the quæstor of Crassus, and preserved the few troops of that general who escaped from the bloody battle with the Parthians. With these he defended Syria against the Parthians till the arrival of Bibulus. In the famous civil war that broke out between Pompey and Cæsar he espoused the cause of the former, and, as commander of his naval forces, rendered him important services. When Cæsar, after the victory of Pharsalia, was in pursuit of Pompey, he advanced with a few vessels, while crossing the Hellespont, against a fleet of 70 sail commanded by Cassius, and called upon him to surrender. The latter, astonished by his daring courage, surrendered at his summons. Cæsar pardoned him, and afterward bestowed various honors on him; but Cassius, who had always cherished feelings of bitter hatred toward Cæsar, joined in the conspiracy against him, and, with the aid of several fellow-conspirators, assassinated him, 44 B.C. He then, together with Brutus, raised an army to maintain the cause of their faction. They were met by Octavianus and Antony, who professed themselves the avengers of Cæsar, at Philippi. The wing which Cassius commanded being defeated, he imagined that all was lost, and killed himself, 42 B.C. See BRUTUS; CÆSAR.

Cassius, Purple of. See PURPLE OF CASSIUS.

Cassivellaunus, kăs-ĭ-vĕ-lô'nŭs (in Shakespeare's 'Cymbeline,' CASSIBELAN), a noble and warlike British chief of the Catuvellauni, who, when Cæsar invaded Britain in 54 B.C., held sway over several tribes living to the north of the Thames, and led the resistance to the advance of the Roman general. Having advanced to the Thames, Cæsar found the Britons under Cassivellaunus posted on the north bank of the river prepared to dispute his passage. He crossed, however, without much difficulty, but the British charioteers persistently harassed his line of march. The Trinobantes, a tribe of Essex and Middlesex, soon sent in their submission to Cæsar, and as their example was followed by others, Cassivellaunus found himself unable to oppose resistance to the Romans. His stronghold, which contained many cattle, was captured by Cæsar; and an attempt made to storm Cæsar's naval camp proving unsuccessful, Cassivellaunus sued for peace, gave hostages, and promised an annual tribute.

Cassock, a name formerly applied to a long loose gown worn over the other garments, in which sense the word is found in Shakespeare. It is now applied to a tight-fitting coat worn under the gown or surplice by the clergy.

The cassock is generally black; but in the Catholic Church only the ordinary priests wear black cassocks, those of bishops being purple, of cardinals scarlet, and that of the Pope white.

Cas'sowary, a corruption of a Malayan name for birds of the family *Casuariidæ* belonging to the *Ratitæ,* their affinities being greatest with the emu. The shortness of their wings totally unfits them for flight. As in others of this group, the pectoral or wing muscles are comparatively slight and weak, while those of their posterior limbs are very robust and powerful. The wings of the ostrich are of some assistance to it in running, but those of the cassowary are too short to be of service in this way, and with the exception of the ends of the five stiff quills are completely hidden beneath the plumage. The cassowaries have three toes, all provided with nails, of which the inner one is much elongated.

The cassowaries constitute a single genus (*Casuarius*) all the species of which have a long compressed bill, a cancellated bony crest or helmet on the head, and stiff barbless quills on the wings. Several species are known, and of these one of the most familiar is the helmeted cassowary of Ceram (*C. galeatus*), which has the head surmounted by an osseous prominence covered with a sort of horny helmet; the skin of the head and superior part of the neck is naked, of a deep-blue and fiery-red tint, with pendent caruncles or wattles. The naked rigid quills on the wings are used as weapons of defense, but the cassowary is rather timorous and shy. It is about 5½ feet long from the tip of the bill to the extremity of the longest claw. The head and neck together measure 18 inches; the largest toe, including the claw, is 5 inches; and the claw of the inner toe is 3½ inches long.

All the feathers of the cassowary, which have a peculiar structure, are of the same kind, contour feathers serving only for covering, and externally are all of one color. In this genus the aftershaft is as long as the shaft and both are filamentous. The double feathers are of unequal length, some on the rump being 12 or 14 inches long, while others are only 3. The stem or shaft is flat, shining, black, and knotted below, having a beard arising from each knot. The helmet is black in front and yellow behind. The eye is of a bright yellow, and more than an inch in diameter.

The anatomy of the cassowary differs very materially from that of the ostrich, which it resembles so much in general appearance. The intestines are short, and the cæcum small; there is no stomach intermediate to the crop and gizzard, and the cloaca is not larger in proportion than that of other birds. It feeds on fruits, eggs of birds, etc., and inhabits the forest districts.

As might be inferred from its structure, the cassowary is a swift runner, and its mode of progression, being unaided by wings, is as peculiar as it is efficient. In running, the cassowary appears to strike out powerfully with one leg, so as to project its body violently forward with a bounding motion, far surpassing the speed of a horse. It also kicks violently when, in a state of captivity, it is provoked to anger, and can inflict a very severe blow. The eggs of the galeated cassowary are green, and are neither so round nor so large as those of the ostrich. The shell is marked by numerous little deep-green tubercles. The largest of their eggs measure about 15 inches in length and 12 round. Eight species, with a number of local races, are known, distributed with New Guinea as a centre to this and surrounding islands and the adjacent parks of Australia. See also EMU; OSTRICH.

Consult Rothschild, 'Transactions of the Zoological Society,' London, 1901; Mosenthal & Harting, 'Ostriches and Ostrich-Farming.'

Cassowary-tree. See CASUARINA.

Cast, in the fine arts, is an impression taken by means of wax or plaster of Paris from a statue, bust, bas-relief, or any other model, animate or inanimate. In taking a cast from a living person's face, it is necessary, first, to anoint the eyebrows and eyelashes, and any hairs about the cheeks and temples, with a little sweet-oil; then to insert two tubes (oiled also) of pasteboard into the nostrils, so that breathing may be performed through them; a handkerchief is then to be tied loosely over the face, and the head sloped backward in an elbow chair or sofa. Powdered and calcined plaster of Paris is then mixed with spring water to the consistence of cream, and poured in between the face and handkerchief to the depth of half an inch. On becoming fixed or hard, it is removed and left to dry. When dried thoroughly it is well soaked with linseed-oil, and an impression may then be taken from it, in plaster of Paris or soft clay; the hollow cast being first split longitudinally down the nose, so that the object cast may be more easily removed.

It ought to be observed that all models should be divided into several pieces or joints; thus, in that covering any round body, one side must be covered first with the plaster, and the sides pared with a knife, and smeared with clay and water, then the remaining part of the object covered with plaster, and a joint will thus be formed between the two parts; for, wherever the mixture of clay and water has been applied with a hair brush, the cast will not adhere, and therefore will be easily separated with the blunt edge of a knife. It is usual also to make small pits or depressions of the size of small buttons, on the edges of the joints of molds, so that they may lock together well when added, and thus fit closely.

Plaster casts are varnished by a mixture of soap and white wax in boiling water. A quarter of an ounce of soap is dissolved in a pint of water, and an equal quantity of wax afterward incorporated. The cast is dipped in this liquid, and after drying a week is polished by rubbing with soft linen. The surface produced in this manner approaches to the polish of marble. When plaster casts are to be exposed to the weather, their durability is greatly increased by saturating them with linseed-oil, with which wax or rosin may be combined. When intended to resemble bronze, a soap is used made of linseed-oil and soda, colored by the sulphates of copper and iron. Walls and ceilings are rendered waterproof in the same way.

Cast, or **Casting-line,** a gut line used in angling, from two to four yards in length, having artificial flies attached to it at intervals of about two feet.

Cast Iron, iron obtained from the blast-furnace by running the fused metal into molds prepared for the purpose. The molds are in

the form of long, narrow channels, from which the iron, when it has cooled and solidified, is taken in bars called "pigs," between three and four feet long, and three or four inches broad. See IRON.

Cast Steel, blister steel which has been broken up, fused in a crucible, cast into ingots, and rolled. The blocks of steel are melted in crucibles of refractory clay, and the molten metal is poured into ingot-molds of cast iron. These are opened to let out the red-hot ingot, which is then passed to the rolls. The process of making cast steel was invented by Benjamin Huntsman, of Attercliff, near Sheffield, in 1770. See STEEL MANUFACTURE.

Castagno, Andrea del, än-drā'ä dĕl käs-tän'yō, Italian painter: b. Castagno, Tuscany, about the end of the 14th or beginning of the 15th century; d. 1480. Being early deprived of his parents, who were extremely poor, he was employed by his uncle to tend cattle in the fields, and in that situation, by his surprising and untutored essays in the art, attracted the notice of Bernardetto de Medici, who placed him under the tuition of one of the best masters Florence then afforded. At first he painted only in distemper and fresco, and was in high repute when Florence was visited by Domenico Venetiano, who had learned from Antonello da Messina the new method of painting in oil and varnish, till then unknown in Tuscany. The splendor of this mode of coloring was much admired, and by a pretended friendship for Domenico, Castagno obtained his secret; but not satisfied with this he desired to be the sole possessor, and determined to murder his friend and benefactor. This he effected without any suspicion, and continued to practise his ill-acquired art with great success. The real author of this atrocious act was never discovered until Andrea made a full confession of his guilt shortly before his death. The best of his remaining works are at Florence, in the church of St. Lucia de Magnuoli, and in the monastery Degli Angeli. The latter contains a crucifixion by him painted on a wall.

Castaigne, André, än-drā käs-tän, French artist: b. Angoulême 1861. He studied at the Suisse Academy and at the École des Beaux Arts in Paris; he exhibited at the Paris Salon in 1884 and several times in later years. Among his pictures are 'Dante and Beatrice'; 'The Deluge'; 'Portrait of Vicomte de Dampierre'; and 'After the Combat' (in the Peabody Gallery at Baltimore). In 1890 he came to the United States and remained here until 1895. He was director of an art school in Baltimore and in 1891 began the illustrating work by which he is best known to the American public. His first work of this character was 'The Forty Niners' Ball' in the 'Century Magazine' for May 1891; since then he has illustrated for several of the leading magazines; his designs include the pictures of the Texas cowboys in 'Scribner's Magazine' and the World's Fair drawings and illustrations for 'Polly' in the 'Century.' On his return to France he became instructor in the Colarossi Academy and opened a studio in Paris. See 'The Critic' Vol. XXIII., 57; 'The Bookbuyer' XII., 506.

Casta'lia, a celebrated fountain in Greece, the sacred spring of the Delphic oracle, at which all the pilgrims to Apollo's shrine were obliged to purify themselves. It issues from a fissure between two peaked cliffs, which form the summit of a semicircular range of rocks, anciently called the Phædriades. These immediately adjoin Mount Parnassus, and rise to the height of 2,000 feet. The Castalian spring was said to impart poetic inspiration to those who drank of it, but it was only latterly by the Roman poets that it was invested with this tribute. It is now called the Fountain of St. John, from a small chapel dedicated to St. John which stands near its source.

Castalides, käs-tăl'ĭ-dēz, the Muses, so called from the fountain Castalia, at the foot of Parnassus.

Castalio, Sébastien, sā-bäs-tē-ŏn käs-tăl-yō, French theologian: b. Dauphiny 1515; d. Basel 20 Dec. 1563. His original name was Châteillon. Through the influence of Calvin he was made professor of classical literature at Geneva. Having quarreled with the reformer, who caused his banishment in 1544, he repaired to Basel, where he taught the Greek language; but as his stipend did not suffice to support his numerous family, he was compelled to employ part of his time in agricultural labors. He made a Latin translation of the Bible, the best edition of which is in folio, Basel, 1573. He defended the right of free discussion in a collection of maxims compiled from various sources.

Casta'nea, a trade name for the Brazilnut and the genuine name for the chestnut (qq.v.).

Cas'tanets, small wooden rattles, made in the shape of two bowls or cups, fitted together and tied by a string, and then fastened to the thumbs. The fingers being rapidly struck upon them, a tremulous sound is produced, which marks exactly the measure of the dance. Something similar to this was the *krotalon* of the ancients, who also made use of small cymbals in their dances and festivals in honor of Bacchus. It is probable, however, that they had their origin in the East, and were brought by the Moors into Spain. Here, too, they received their name *castañuelas,* from being commonly made of the wood of the chestnut (*castaño*), or from their color. They are still in use in Spain, and here and there in the south of France. The charm of variety has also procured for them a place in ballets and operas.

Castanheda, Fernao Lopez de, fĕr-nā'o lō'-pāth dā käs-tän-yā'dä, Portuguese historian: b. Santarem about 1500; d. Coimbra 23 March 1559. His father having been appointed to an important post in India, he was taken thither in youth, and was thus led to make the careful and unremitting researches embodied in the 'History of the Discovery and Conquest of India by the Portuguese' (1551–61), a work upon which Camoens drew largely in the course of his epic activity.

Castaños, Don Francisco Xavier de, frän-thēs'kō HÄ-vē-ār' dā käs-tā'ñōs, Duke of Baylen, Spanish military officer: b. Madrid 22 April 1756; d. Madrid 24 Sept. 1852. Educated in military science in Germany, on the invasion of the country by Napoleon, he received the command of a division of the Spanish army, and in July 1808 compelled 18,000 French, under Gen. Dupont de l'Etang, to surrender at Baylen, but was in turn defeated by

Lannes in November of the same year at Tudela. Under Wellington he served as general of the 4th Spanish *corps d'armée*, and took part in the battles of Albuera, Salamanca, and Vittoria. In 1815 he was placed at the head of the Spanish army for the invasion of France, which was rendered unnecessary by the victory at Waterloo. In 1825 he was called to the State Council, where he became a decided opponent of the Carlist party.

Caste, a social class whose burdens and privileges are hereditary. The word is from the Portuguese *casta,* race, and was applied by the Portuguese, who became familiar with Hindustan, to the classes in India whose occupations, privileges, and duties are hereditary. This term is sometimes applied to the hereditary classes in Europe; and we speak of the spirit or the prerogatives and usurpations of a caste, to express particularly that peculiar constitution of society which makes distinction dependent on the accidents of birth or fortune. The division into castes, where it appears in its most typical form, comes to us from a period to which the light of history does not extend; hence its origin cannot be clearly traced: but it is highly probable that wherever it exists it was originally grounded on a difference of descent and in modes of living, and that the separate castes were originally separate races of people. This institution has been found among many nations. According to the accounts collected by Clavigero, some traces of it were apparent among the Peruvians and Mexicans; but it prevails principally in the East, where it has existed from the earliest times, and has become blended with the political condition of the people. The division into castes was entirely interwoven in the whole fabric of civil society, in ancient Egypt and India. In Egypt this division was perfected as a political institution in the flourishing period of the Pharoahs; and the lines of separation which had been drawn in earlier times by a difference of descent and different modes of living were then rendered still more distinct. The number of castes in that country is variously stated by Herodotus, Plato, Diodorus, and Strabo. The institution of caste, however, is best known to us as it exists in Hindustan, where it is well known to have existed since perhaps 1,500 or 2,000 years before the Christian era. The great Indian castes are four in number, namely, the Brahmans or sacerdotal class; the Kshatriyas or military class; the Vaisyas or mercantile class; and the Sudras or servile class. The three castes first named are regarded as being altogether of a higher character than the fourth, rejoicing in the peculiar religious distinction of being "twice-born" as contrasted with the "once-born" Sudras. This distinction is undoubtedly ethnical in its origin, the twice-born castes being descendants of the Aryan invaders and conquerors of the country, while the once-born are the representatives of the conquered. Caste, however, is a much more complicated thing than would be supposed from this brief statement, since the principle of caste classification according to employment as well as to race has long prevailed, and from early times there has been an intricate mingling of castes. The Brahmans are the sacerdotal caste, but, according to Sir W. W. Hunter ('The Indian Empire,' 2d edition, 1893), "Even among the Brahmans, whose pride of race and continuity of tradition should render them the firmest ethnical unit among the Indian castes, classification by employment and by geographical situation, plays a very important part; and the Brahmans, so far from being a compact unit, are made up of several hundred castes, who cannot inter-marry nor eat food cooked by each other. . . . In many parts of India, Brahmans may be found earning their livelihood as porters, shepherds, cultivators, potters, and fishermen, side by side with others who would rather starve, and see their wives and little ones die of hunger, than demean themselves to manual labor, or allow food prepared by a man of inferior caste to pass their lips." Altogether some 1,886 separate Brahmanical tribes have been enumerated, and the Kshatriyas or Rajputs now number 590 tribes in different parts of India. "In many outlying provinces we see non-Aryan chiefs and warlike tribes turn into Aryan Rájputs before our eyes. Well-known legends have been handed down of large bodies of aliens being incorporated from time to time even into the Brahman caste." While there has been a tendency in the different provinces for every separate employment to develop into a distinct caste, there are also instances of castes changing their employment and raising themselves in the social scale. Thus the Vaisyas, who were anciently that Aryan caste upon whom the tillage of the soil fell, have become the merchants and bankers of India, leaving to the Sudras and mixed castes the labor of cultivation. "Each caste is to some extent a trade-guild, a mutual assurance society, and a religious sect. As a trade union it insists on the proper training of the youth of its craft, regulates the wages of its members, deals with trade delinquents, supplies courts of arbitration, and promotes good fellowship by social gatherings. . . . The caste or guild exercises a surveillance over each of its members, from the close of childhood until death. If a man behaves well he will rise to an honored place in his caste; and the desire for such local distinctions exercises an important influence in the life of a Hindu. But the caste has its punishments as well as its rewards. The fine usually takes the form of a compulsory feast to the male members of the caste. This is the ordinary means of purification or of making amends for breaches of the caste code." A person who has become an "out-caste," or lost his caste position and privileges, may generally recover them in this way.

Castel Nuovo, käs'tĕl nwō'vō, or **Novo,** Austria, a town and commune of Dalmatia, in the circle of Cattaro. It stands near the entrance to the Gulf of Cattaro, and is surrounded by walls which have suffered much from repeated sieges and earthquakes. It contains two churches, a Roman Catholic and a Greek; a lazaretto, and custom-house. The chief manufacture is in articles of brass. The country around is beautiful and fertile. The population of the town is small, but that of the commune is about 10,000, most of whom belong to the Greek Church.

Castel Vetrano, käs'tĕl vā-trā'nō, Sicily, a town in the province and 27 miles southeast of Trapani, on a rocky hill. It lies in a fertile district, is regularly built, has several churches, grammar school, with municipal museum, etc. The white wine produced in the neighborhood

is esteemed the best in Sicily. Articles of coral and alabaster are manufactured here. Pop. (estimated) 25,000.

Castelar, käs tā lär, **Emilio,** Spanish statesman: b. Cadiz 8 Sept. 1832; d. Murcia 25 May 1899. He studied at Madrid, and in 1856 became professor of history and philosophy in the university there. He began early to write on letters and politics in the newspapers and magazines, and in 1864 started *La Democracia* (*The Democrat*), in the pages of which he inveighed fiercely against the government. After the abortive rising of 1866 he was condemned to death, but contrived to escape to Paris, returning when the revolution of 1868 began. All his ardor and eloquence could not hinder the crowning of King Amadeus, though it helped to bring about his downfall in 1873. In September of that year the Cortes made Castelár dictator, but the orator proved somewhat ineffectual in action, and found himself unable to crush either the "red demagogy of Socialism on the one hand, or the white demagogy of Carlism" on the other. In the beginning of 1874 a hostile vote in the Cortes obliged him to resign, and soon after the *pronunciamiento* in favor of Alfonso XII. drove him across the frontier. He returned to Spain in 1876, and was returned to the Cortes, where, till his retirement in 1893, he often spoke with all his old eloquence. His chief writings are: 'Civilization' (2d ed. 1865); 'Questions, Political and Social' (3 vols. 1870); 'Parliamentary Discussion' (3 vols. 1871); 'History of the Republican Movement in Europe' (2 vols. 1874); 'The Oriental Question' (1876).

Castelein, Matthiis de, mä-tē'īs dė käs'tē-līn, Dutch poet: b. Pamele (Oudenarde) 1485; d. 1550. He was the acknowledged lawgiver and pattern of all the Dutch rhetoricians of his time, in his 'Art of Rhetoric.' He composed many plays, but only two of them were published; one of these is the 'Story of Pyramus and Thisbe.' He wrote also 'Ballads' and a volume of 'Various Lays,' in melodious verse.

Castellamare, käs-tėl-lā-mä'rē, or **Castellammare,** Italy, a seaport town on the Gulf of Naples, 17 miles southeast of the city, at the beginning of the peninsula of Sorrento, and 10 miles northeast of that town. It extends for a mile along the shore at the base and on the slope of a spur of Monte Sant' Angelo (4,735 feet high), a mountain which commands a splendid prospect. From its pleasant surroundings, shady walks, sea baths, and other attractions, it is a favorite summer resort of the Neapolitans, as well as tourists, and has several good hotels, one of them formerly a royal residence. The harbor is protected by a mole, and there is an arsenal with a dockyard. The town owes its name to a castle built by the Emperor Frederick II. in the 13th century. Castellamare occupies the site of the ancient Stabiæ, overwhelmed, with Herculaneum and Pompeii, by an eruption of Vesuvius, 79 A.D.; and it was here that the elder Pliny met his death by approaching too near to the mountain when in a state of eruption. The modern town was afterward built from the ruins of Stabiæ. Pop. about 33,000.

Cas'tellan, or **Chatelain,** properly the owner or commander of a castle. In Flanders and France the title went with the possession of certain districts, and in Normandy and Burgundy châtelains ranked next after bailiffs, with both civil and military authority. In Germany the châtelains were imperial officers with military and civil jurisdiction in fortified places.

Castellane, Esprit Victor Elizabeth Boniface, ĕs-prē vēk-tōr ā-lē-zā-bĕt bŏn-ī-fās, COUNT OF, French marshal: b. Lyons 1788; d. 1862. He entered the army in 1804, and took part in most of Napoleon's campaigns. After the restoration he became colonel of the Hussars of the Royal Guard. He fought in Spain (1823), and at the siege of Antwerp (1832), and as lieutenant-general commanded the Army of the Pyrenees. In the February revolution (1848), he lost his command, and in consequence went over to Louis Napoleon. In 1850 he became commander at Lyons, and in 1852 marshal and senator. His 'Memoirs,' published in 1896, though crude in style, are valuable for their mass of minute detail.

Castelli, Benedetto, bā nā dĕt'tō käs-tĕl'lē, a pupil of Galileo: b. Brescia 1577; d. 1644. He was a monk and became abbot of a Benedictine monastery of the congregation of Monte Cassino. He afterward became a professor of mathematics, and taught with distinguished success both at the University of Pisa and at the Collegio della Sapienza at Rome. Torricelli was his pupil. He distinguished himself in hydraulics, and rendered important services to Urban VIII. in his projects for the regulation of Italian rivers. He may be regarded as the founder of that branch of hydraulics which relates to the velocity of running water, though his fundamental principle, that the velocity is proportional to the height of the reservoir, is inaccurate, and was demonstrated to be so by Torricelli, who showed that the velocity is proportioned, not to the height, but to the square root of the height. In his investigations as to the measurement of time Castelli made use of the pendulum. His principal work, entitled 'Della Misura dell' Acque Correnti,' published at Rome in 1628, was translated into French in 1664.

Castelli, Ignaz Franz, Austrian dramatist: b. Vienna 6 May 1781; d. there 5 Feb. 1862. He was educated for the law, but following his inclination for the drama, gained access to the orchestras of theatres as a player of the violin. His circumstances compelling him to look out for some means of support, he accepted various subordinate offices, but using his leisure in composing patriotic songs for the Austrian army, he was brought into favorable notice. His songs having given umbrage to Napoleon, he fled to Hungary. In 1815 he accompanied Count Cavriani as secretary to Paris, and afterward he served in the same capacity with Baron Münch von Bellinghausen in Upper Italy. In 1840 he retired with a pension and the office of state librarian. The author of many poems, popular songs, and miscellaneous writings, he was at various times connected with the press of Vienna, but is best known by his voluminous productions for the stage. Over 100 plays, partly adapted from the French, partly original, are attributed to him. In 1848, more than 100,000 copies of his political pamphlets in favor of the Revolution found eager purchasers.

Castellio, käs-tĕl-lī-ō, **Sebastianus,** French theologian and humanist, translator of the Bible into pure and classic Latin; he was a native of

Dauphiny: b. 1515; d. Basel 1563, in exile and in extreme poverty. His family name was Châteillon, which he latinized after the fashion of that time into Castellio. At the invitation of Calvin he settled at Geneva, where he became professor of the ancient classic literatures, but because of differences regarding questions of religious belief he was deposed from the professorship and banished from Geneva. His Latin version of the Bible retained little or nothing of the profoundly Hebrew character of the scriptural writings, and was justly censured by Calvin and the Calvinists. Theodore Beza, to offset this "work of Satan," as he called it, made a Latin translation of the Bible himself, striving to retain the Oriental flavor of the original in every respect. Castellio also wrote a book in defense of the right to hold and publish views deemed by Church and state to be heretical; this, too, evoked a reply from Beza. Castellio wrote also a tractate on 'Predestination Opposed to the Views of Calvin'; it was published after the author's death by Faustus Socinus in 1578.

Castello, käs-tĕl'lō, **Gabriel Lancelot,** Italian antiquary: b. Palermo 1727; d. 1794. He was descended from a noble family, and was placed under a private tutor with a view to study botany, chemistry, etc.; but accidentally meeting with some old coins which had been dug up by a plowman, he was seized with a great desire to decipher them, and from that time devoted himself to antiquarian pursuits. He formed a splendid collection of the remains of antiquity found in Sicily, and his museum was always open to foreigners as well as to natives. On his death-bed he bequeathed a large quantity of books, etc., to the public library of Palermo. At his death he was honorary member of the Royal Society and of the Academy at Paris. He published several works.

Castello-Branco, Camillo, kä-mēl'lō käs-tĕl'lō brän'kō, Portuguese novelist and poet: b. Lisbon 16 March 1826; d. 6 June 1890. He is the most popular of the modern romancists of Portugal, and at the same time the most national in tone, spirit, and form. Realism characterizes his numerous novels (over 100), the best known being: 'Love of Perdition' (1862); 'The Marquis of Torres Novas'; 'Brilliants from Brazil.' All of them are genuine pictures of Portuguese life. Among his poetic compositions, the collection published under the title, 'A Book' (1854), holds the first place.

Castellon, Francisco, frän-chĕs'kō käs-tĕl-yōn', Nicaraguan revolutionist: b. about 1815; d. 2 Sept. 1855. He was the leader in a revolt at Leon in 1853, which was unsuccessful, and fled to Honduras, whence he returned in June of the next year. It was by his invitation that the filibustering expedition under William Walker went from the United States in 1854.

Castellon de la Plana, dā la plä'nä, Spain, capital of the province of Castellon, 40 miles north-northeast of Valencia. It stands in a large and fertile plain, watered by the Mijares, from which an ample supply of water is brought into the town by an aqueduct supposed to have been constructed by Jayme I. of Aragon, who, in 1233, wrested Castellon from the Moors. It is well built, and has considerable manufactures of sailcloth, and woolen and hempen fabrics, ropes, paper, soap, etc., and some trade in hemp, grain, and fruit. The painters Ribalta, father and son, were born here. Pop. of town 31,272; of province, 304,477.

Castelnau, käs-tĕl-now, **Francis** (COMTE), French traveler: b. London 1812; d. Melbourne, Victoria, 4 Feb. 1880. He traveled extensively in Canada, the United States, and Mexico, and under the protection of the French government undertook an exploration of South America in 1843, accompanied by D'Osery, a botanist; Weddell, a botanist; and Deville, a taxidermist. After his return to France, in 1847, Count Castelnau published 'Expedition dans les parties centrales de l'Amerique du Sud' (1850–1), a work in six volumes, of which one was by M. Weddell. Castelnau afterward traveled in Arabia, and was successively consul at Bahia, the Cape of Good Hope, and Singapore, and at the time of his death was consul-general at Melbourne.

Castelnaudary, käs-tĕl-nō-dä-rē, France, a town in the department of Aude, on a height above the Canal du Midi, 22 miles west-northwest of Carcassonne. It was built by the Visigoths on the site of a rich town which had been destroyed, and was named Castellum Novum Arianorum, from which its present name is corrupted. It rises in the form of an amphitheatre, and was anciently the capital of a district, and strongly fortified. It was the scene of much barbarity by the inquisitors in 1237, was almost totally destroyed by Edward the Black Prince in 1355, and is famous for the battle fought beneath its walls in 1632 between the troops of Louis XIII. and those of Gaston of Orleans, which resulted in favor of Louis chiefly in consequence of the inactivity of the Duke of Orleans. The Duke of Montmorency was wounded in this battle and taken prisoner, and afterward executed at Toulouse by order of the king, Louis XIII. It is indifferently built, but has manufactures of coarse cloth, several distilleries and tanneries, and one of the largest grain and flour markets in the south of France. Pop. about 10,000.

Castelnovo, Leo di, lā'ō dē käs-tĕl-nō'vō. See PULLE, LEOPOLDO, COUNT.

Castelnuovo, Enrico, ĕn-rē'cō käs-tĕl nwō vō, Italian novelist: b. Florence 1839. His stories have attained great popularity; among them: 'Prof. Romualdo' (1878); 'Two Conventions' (1885); 'Reminiscences and Fancies' (1886). He is one of the acknowledged Italian masters of the "novel of the inner life" (romano intimo).

Castelvecchio, Riccardo, rē-cär'dō käs tĕl vĕk'ē-ō. See PULLE, GIULIO, COUNT.

Casti, Giambatista, jäm-bä-tēs'tä käs'tē, Italian poet: b. Prato, in the vicinity of Florence, 1721; d. 7 Feb. 1803. He studied at Montefiascone, became professor there, was appointed a canon, and made a journey to France. Receiving an invitation from the Prince of Rosenberg, who became acquainted with him in Florence, he went to Vienna, and was presented to Joseph II., who knew how to appreciate the genius of the poet, and delighted in his conversation. Casti took advantage of every opportunity of visiting other courts, and joined several embassies without office or title. Catherine II. received him in the most flattering manner. He visited also the court of Berlin, and several other German courts. After his return

to Vienna, Prince Rosenberg, the director of the Imperial Theatre, caused him to be appointed *poeta Cesareo* on the death of Metastasio. After the death of Joseph II. Casti requested his dismission, and retired to Florence, where he wrote many of his works. In 1783 he went to Paris. His 'Novelle Galanti' were republished at Paris 1804, under the title 'Novelle di Giamb. Casti,' in three volumes. They are 48 in number. Almost all are of a licentious character, but written in a lively, original, and graceful style. The same may be said of his didactic-satirical poem, 'Gli Animali Parlanti, Poema Epico di Giamb. Casti' (Milan 1802, 5 vols.). There are translations of it in French, German, and English. Casti's 'Rime Anacreontiche' are pleasing, and his comic operas, 'La Grotta di Trofonio' and 'Il Re Teodoro in Venezia,' etc., are full of wit and originality.

Castiglione, Baldassare, băl-dās-sä'rā käs-tēl-yō'nā, Italian writer: b. Casatico, in the territory of Mantua, 1478; d. 8 Feb. 1529. He studied at Milan, and entered into the services of the Duke Ludovico Sforza, and afterward of the Duke of Urbino, of whose elegant and splendid court he soon became an ornament. By him he was sent as an envoy to Henry VII. of England, and afterward in the same capacity to Louis XII., at Milan. In 1513 Castiglione appeared as ambassador at the court of Leo X., where he became intimate with the most distinguished literati and artists. In 1521 he obtained for the new Duke of Urbino, Federigo, the command of the Papal troops, and in 1524 was employed by Pope Clement VII. to conduct his negotiations with Charles V. When Rome was plundered by the Constable of Bourbon in 1527 he was accused of negligence, and his health was undermined by chagrin. He refused to accept the rich bishopric of Avila, which was offered to him by the emperor, until the Pope should be reconciled with Charles. Among his works, the 'Libro del Cortegiano' is the most celebrated. It teaches the art of succeeding at court. His few Italian and Latin poems are elegant. His letters are valuable contributions to political and literary history.

Castiglione, Carlo Ottavio, COUNT, Italian scholar: b. Milan 1784; d. Genoa 10 April 1849. His *magnum opus,* published in 1826, is a work in which he seeks to ascertain the origin and the history of the towns in Barbary whose names are found on Arabic coins. Out of Italy, however, he is best known by his edition of some fragments of the Mœso-Gothic translation of the Bible by Ulfilas, which had been discovered in 1817 by Cardinal Mai among the palimpsests of the Ambrosian Library.

Castiglione, Giovanni Benedetto, jō vän nē bā-nā-dĕt'tō, Italian painter: b. Genoa 1616; d. 1670. He was a pupil of Paggi, Ferrari, and Antony van Dyck, studied at Rome, Florence, Parma, and Venice, and formed his style on the best masters. He is particularly celebrated as a painter of animals, and in these subjects, as well as his other paintings, is remarkable for softness, elegance, and beauty. Of his larger pieces, the most celebrated are the 'Creation of the Beasts,' 'Their Entrance with Noah into the Ark,' and 'Jacob's Return with His Family and Servants, His Flocks, and Herds'—all in the Brignol Palace. He also distinguished himself as an engraver, and from his skill in the production of light and shade has been called the second Rembrandt.

Castiglione Del Stiviere, dĕl stēv-yā'rā, Italy, a small city in the province of Mantua, 17 miles southeast of the town of Brescia, 22 miles northwest of Mantua. It is well built, surrounded by walls, defended by an ancient castle, and contains a large square adorned with a central fountain, three churches, and a town hall. A well-attended annual fair is held in June. The French obtained here a decisive victory over the Austrians on 5 Aug. 1796, which gave to Marshal Augereau his title of Duc de Castiglione.

Castile, New. See NEW CASTILE.

Castilho, Antonio Feliciano, än-to'nē-ō fā-lē-chē-ä'nō käs-tēl'yō, Portuguese poet: b. Lisbon 26 Jan. 1800; d. 18 June 1875. Though almost blind, he studied jurisprudence at Coimbra. His first poetical composition, 'Letters of Echo and Narcissus,' published while he was a student, won him great celebrity. He excelled in pastorals; and to this class belong his 'Spring' and 'Love and Melancholy, or the Latest Heloïse.' He had a deep sympathy with nature, and was a master of elegiac verse.

Castilla, käs-tēl'yä, **Ramon,** Peruvian soldier and politician: b. Tarapaca 30 Aug. 1796; d. there 30 May 1867. He served in the Spanish cavalry until 1821, when Gen. San Martin proclaimed Peruvian independence. Castilla, then a lieutenant, joined the liberating army, in which he distinguished himself. He was elected president of Peru in 1845. At the expiration of his term of office, in 1851, he was succeeded by Gen. José Rufino Echénique, but usurped the power in 1855, and was, by a majority of 70,374 votes, re-elected to the presidency in August 1858. After being succeeded by San Roman in 1862, Castilla lived in retirement till his appointment to the presidency of the senate in 1865.

Castillejo, käs-tēl-yā'hō, **Christoval de,** Spanish poet, the last representative of the ancient Spanish poetry: b. Cindad Rodrigo about 1494; d. Vienna 12 June 1556. He opposed the introduction of Italian styles into the poetry of Spain, and justified his opposition by demonstrating in his own work the competence of the traditional styles of Spain for the expression of all moods and all sentiments. His satiric vein, especially in the 'Dialogue on the Condition of Women' and the 'Sermon on Loves,' offended both clergy and laity.

Castilloa Elastica, a lofty forest-tree, belonging to the Bread-fruits (*Artocarpaceæ*). Some specimens have near the ground a circumference of from 10 to 12 feet. The tree is native to southern Mexico and the Central American countries, and supplies the Central American rubber of commerce. This rubber, instead of being molded, as is Para rubber, is made into sheets (hence called sheet-rubber), and hung up to dry. *Castilloa elastica* has been found to be cultivable in India and Ceylon.

Castillon, käs-tē-yōn, France, a town in the department of Gironde, on the right bank of the Dordogne, 33 miles east of Bordeaux by rail. Beneath its walls, on 13 June 1453, the English met with a signal defeat, their leader, Earl Talbot of Shrewsbury, and his son, being slain. Part of the battle is described in the fourth act of Shakespeare's 'King Henry VI., Part I.'

Castine, Vincent, văñ-sŏñ kās-tēn, BARON DE, French soldier: b. Oleron 1650; d. 1722. He went to Canada in 1665, established a mercantile house at Penobscot (now the town and port of entry of Castine, Me.), in 1687, and married the daughter of the Penobscot chief. In 1696 he captured Pemaquid, at the head of 200 Indians. He assisted in the defense of Fort Royal, in 1706, and was there wounded the following year. His son, who succeeded him in command of the Penobscots, was made prisoner and taken to Boston in 1721.

Casting, the running of melted metal into a mold, so as to produce an object in metal having the shape of the mold. Iron-casting or iron-founding is carried on by three methods, the first called "open sand-casting," the second, "sand-casting between flasks," and the third, "loam-casting." In most of these an exact pattern, usually of wood, is employed by the founder. The floor of every foundry is composed, for several feet deep, of a loamy sand, in which deep pits may be sunk to bury large molds. This floor must be kept exceedingly dry, and free from any wet or moisture, otherwise the melted matter, converting the watery particles into vapor, would blow up the building and destroy the workmen. In the place where the mold is to be made, a layer of sand is lightly sprinkled through a sieve on the floor, and the wooden pattern pressed firmly down into it, level with the surface. The sand is then to be shoveled up all around, level with the top of the pattern, and rammed down with a tool. A moist sponge is then used for slightly wetting the sand all round the edges of the pattern, to make its particles adhere together. The next operation is lifting the pattern out of the sand by one or more screws, screwed into the wood. If the pattern is small, this can be easily done by one or more men; but in very large works it is effected by a crane. The workman then uses a pair of bellows for blowing away any small pieces of sand which may have fallen into the mold, and then sifts some finely powdered charcoal over its surface. It is now ready for filling with metal. In small works this is done by ladles and in large by small channels made in the sand, leading from the mold to the mouth of the furnace. When the mold is filled, the hot metal is covered with sand to keep the air from it while it is cooling.

Sand-casting between flasks is used for more complex articles than the former; such, for instance, as if they were cut into two or more pieces (provided the cutting planes were parallel to each other), each separate piece might be cast in open sand. The flasks are iron frames furnished with four handles, by which they may be lifted, and having iron points fitting into holes prepared in the other flask for joining them accurately together. The under flask being placed upon a board, filled with sand, and the sand rammed tight into it, the workman then takes the pattern and presses one half of it into the sand, and smooths the sand up to the sides of it with a trowel; he then sets the empty flask over the other, adjusting its points to the holes, and after sprinkling some sand which has been burned (to free it from moisture) over the sand in the under flask, he fills the upper one with sand, and rams it down; he next, with a piece of wood, put through the sand in the upper flask, makes a hole to pour the metal through. The upper flask, with the sand in it, is then raised off by men by the handles, or in large works by a crane, and the pattern lifted out. The flask is then put on again, and heavy weights laid upon it to keep it down ready for casting. It must be observed that at every uppermost point of large molds a small hole must be bored through the sand in the upper flask, to allow the rarefied air to escape out of the mold when melted metal is poured in. To save expense it is now customary to make flasks of any size that may be wanted, out of rectangular iron plates, which are fitted together by means of screws and bolts. This obviates the necessity of keeping a large store of flasks of different sizes, and enables the caster to adapt the form of the flask to that of the model for which it is intended.

Loam-casting is used for bulky, hollow articles, such as cylinders, large pipes, caldrons, boilers, etc., and is conducted in this manner: If, for instance, a large cylinder is to be cast, a mold has first to be made as follows: To a beam in the roof of the foundry is affixed a perpendicular spindle, with three or four holes through it to fix an iron arm in, at different heights, by means of a nut. This arm has two bars placed at such a distance as to be capable of receiving a wooden plank, which can be firmly secured to them by means of two clamps. The operation is then begun by laying an iron ring upon the ground, and adjusting it so as to be concentric to the spindle. A cylinder of brickbats, or clay and wet loam (instead of mortar), is then built upon it, some inches less in diameter than the intended cylinder, for which this is to form a core; the brickbats are then firmly bound together with iron hoops, annealed wire, etc., and a fire is lighted within the erection to dry it. When the loam used between the bricks is dry, a coating of loam is spread over the whole, and is perfectly smoothed by causing the edge of the perpendicular board to revolve round it. This coat makes it of the proper size for the inside of the cylinder to be cast, and is called the core of the mold. Another cylinder is built, plastered, and smoothed in the same way (except that no hoops are used), whose diameter is the same as the outside of the cylinder to be cast. When this is finished it is covered with a coating of charcoal, ground up with water like paint, laid on with a brush, and a thin coating of loam is laid on; this is bound round with hoops, and to these four hooks are fixed to lift it by; a thick coat of loam and hair is then laid over it. When all these are dry a man gets down into the cylinder, and with a small pick pulls down all the bricks in the inside cylinder, and then with a trowel cuts away all the loam, leaving the inside of the external cylinder (which is called the mold) quite smooth. This is effected by the coating of powdered charcoal, which prevents the two coats of loam from adhering. A deep pit is now dug in some convenient part of the foundry, into which the core is let down by a crane. The core being placed in the pit, the mold is let down after it by the same means; and when they are adjusted, the sand is thrown and rammed round about half the height; a flat cover of dried loam is then put on the top of the mold and core, and round pieces of wood are put in the holes which had before been made in the cover for pouring the metal in. The burying of

the mold is then completed. When it is all leveled, the sticks which keep open the holes for the metal are carefully withdrawn, and small channels made from the furnace to allow the melted iron to find its way to the mold. When the form is more complicated, as in pear-like shapes, etc., where a man cannot be introduced to pick out the bricks, the mold must be sawn in two perpendicularly with a fine saw to get it off. It is then put together again round the core, and the crack plastered up with loam.

Casting Away of Mrs. Lecks and Mrs. Aleshine, The, a story by Frank R. Stockton. This chronicle sets forth the curious experiences of Mrs. Lecks and Mrs. Aleshine; two middle-aged widows, from a little New England village, who, having "means," decide to see the world and pay a visit to the son of one of them, who has gone into business in Japan. On the steamer crossing the Pacific they meet a young Mr. Craig, who tells the story. The two ladies and Mr. Craig are cast away in most preposterous circumstances, on a lonely isle in mid-ocean. Many of the scenes, like the escape from drowning of the two widows, are of the very essence of true humor, of a grotesque form; and the story-teller's invention never once flags. The tale presents, intentionally of course, neither evolution nor climax, but only a succession of the oddest incidents. It is a good example of Stockton's unique method of story-telling — the matter extremely absurd and the manner extremely grave, the narrative becoming more and more matter-of-fact and minutely realistic, as the events themselves grow more and more incredible.

Castle, Edmund, English Orientalist: b. 1606; d. about 1685. His life was spent mainly in the compilation of his 'Lexicon Heptaglotton Hebraicum, Chaldaicum, Syriacum, Samaritanum, Æthiopicum, Arabicum et Persicum' (1669), the Syriac division of which is still considered valuable, and he also aided Walton in the preparation of his 'Polyglot.'

Castle, Egerton, English author: b. 12 March 1858. He was educated at Glasgow University and Cambridge. After a brief military career he turned to literature and journalism, and has written: 'Schools and Masters of Fence' (1884); 'Bibliotheca Dimicatoria' (1891); 'Consequences' (1891); 'La Bella and Others' (1892); 'English Book Plates' (1892); 'Saviolo,' a play (1893); 'The Light of Scarthey' (1895); 'The Jerningham Letters' (1896); 'The Pride of Jennico' (1898); and 'Young April' (1899); 'Desperate Remedies,' a play; 'The Bath Comedy' (1899); 'Marshfield the Observer'; 'The Secret Orchard' (1900); 'The House of Romance' (1902). The last named novel with 'The Pride of Jennico' and 'The Bath Comedy' were written jointly by Mr. Castle and his wife, Agnes Castle.

Castle, a word derived from the Latin *castellum,* a diminutive of *castrum,* a fortress or stronghold. The word *castellum* was frequently appiled by the Romans as a military term to denote a redoubt. The word has come to be used as the designation of those strongholds which, in feudal times, served at once as residences and as places of defense for the nobles, and which continued to exist until the invention of gunpowder changed the whole system of fortification. The royal residences among the Franks resembled in some points both the Roman villa and the Roman camp, and those of the Frankish nobles differed little from those of the kings, except in point of simplicity. Strictly speaking, only the grand feudatories had the right to erect fortified castles, and then only after receiving the royal consent; but the grand feudatories very early began to take it upon themselves to grant the privilege of erecting castles to their vassals, and these again to those of a still lower grade. In this way large numbers of castles began to spring up at an early period in France, Germany, England, and elsewhere.

The castles of the Norman Conquest in England were probably the first stone buildings erected there. The great square keep of Rochester Castle is probably of this period; it is about 70 feet square, with projecting corner turrets, and as it now stands is 100 feet high, but the battlements have been altered and its original character lost. A heavy wall divides the huge structure into two nearly equal parts, and within this wall a well is arranged which communicates with all three stories; the outer walls are 12 feet thick at the base and the masonry is very perfect. Little is known of the ancient disposition of the minor buildings. There is no doubt that a high and battlemented wall enclosed a court or perhaps two courts, an inner and an outer bail, as they are called; that the keep was enclosed by the inner bail, but always so near the wall that a postern could communicate with the outer moat, and that within the enclosing wall, often built up against its interior face, were stables and storerooms, and also lodgings for the garrison, which last, however, might be temporary structures. This wall was always surrounded by a deep and broad moat, which might be filled with water in a low country, or, when dry, served merely to increase the effective height of the walls and to disarrange the approach of the besiegers. There was always a chapel, but in Rochester Castle this is built against the southeast corner of the keep and opens from its principal floor. In such an early castle the keep is the only very strong place, as a vigorous attack would breach or scale the outer wall very soon.

The castles of the 12th and 13th centuries were far more elaborate, and their tendency was toward separate posts, each defensible by itself. Every tower could be shut up and defended, its little garrison resisting even after the neighboring works had been captured or rendered indefensible. This arrangement had the disadvantage that a very bold and sudden attack might capture the strongest parts of the castle, even the keep itself, before assistance could come to it. The typical castle of the 12th century is the famed Chateau Gaillard in Normandy, and of the 13th century the famous castle at Coucy, near Laon in northern France; and in the British Isles, Kidwelly in Wales, which remains in a perfectly traceable condition.

The perfect castle was not developed until the time when gunpowder was about to make it useless. Thus the Chateau of Pierrefonds, north of Paris, and near Compiègne, was built about 1400, and in this the faults of the earlier castles were avoided. The walls are everywhere of nearly equal height, the galleries of de-

fense are continuous so that the soldiers of the garrison may run easily the whole length of the walls, and these galleries are two or even three deep, allowing the defenders to throw a prodigious rain of projectiles upon any attacking party. These galleries, built of stone, replace the temporary wooden galleries, always put up on the walls of earlier castles when an attack was anticipated. It is to be noted that the attack and defense in mediæval fortifications was vertical; the higher the wall the more formidable was the blow delivered by a falling ball of stone, or a timber or iron bar; while the projectiles from crossbows and military engines would certainly lose nothing, and the garrison in this way was removed far above the assailant, who must come close under the walls to attack. This attack, then, consisted, in the case of a well defended place, chiefly in breaching or undermining the walls. Escalade was only possible where the garrison was weak or in poor condition or surprised.

Castles often had outer works, thus the barbican or barbacan is strictly a defense built outside of the principal gate, and intended to keep the enemy away from it for a certain length of time. When a castle was near a river an outwork would be built on the other bank, covering the bridge leading to the castle. When the site was high, with steep approaches, a covered way might be built to protect the whole of the path leading up to the castle, and the foot of this would have an outwork or strong post capable of some defense.

The introduction of fire-arms and especially of cannon heavy enough to breach the walls, compelled a change in the old castles, which were often ruined as consistent pieces of mediæval fortification by having their towers cut down to accommodate artillery of defense. A round stone tower 200 feet high would be cut down to a kind of bastion 30 feet high, with a parapet and embrasures for cannon around its platform. Even this was only temporary, for it was soon found that the effect of artillery fire was irresistible by stone walls, and these were abandoned for the sloping rampart of earth introduced in the 16th century. See FORTIFICATIONS.

The term castle was applied to the sea-coast forts which defended our modern sea-ports previous to 1870, and of which some still remain. It was held that the stone wall, 8 or 10 feet thick, carefully built of granite blocks, with the embrasures covered by wrought iron plates and allowing of a great accumulation of guns within a small space, were proof against the attack of a fleet; and this because the fire from the decks of ships cannot be so exact as to produce a breach. It was assumed that the enemy would not be able to make a landing near with effective guns. Thus, at the entrance to Savannah, Fort Pulaski was a «sea-coast castle» of that type, but it was breached in a few hours by the rifled guns landed on Tybee Island.

In modern English nomenclature, a name compounded with castle (such as Castle Howard, Berkeley Castle, and the like) is used for habitable buildings which may have been erected on the site or immediate grounds of an ancient building of defense or within its old walls; but this is a mere whim in the selection of an arbitrary name. On the other hand, Windsor Castle, the favorite residence of Queen Victoria, has retained much of its mediæval defensive character, but the rooms inhabited by the royal family are of the reign of George IV., and the only part of the ancient work which remains in full use is the great chapel dedicated to St. George, a famous and beautiful building completed in the time of Henry VII.

RUSSELL STURGIS.

Castle Garden, the former immigrant depot in New York, at the point of Manhattan Island, in Battery Park. In the early days of the city the place was a small, fortified island a few feet from the mainland: later it became a public hall for assemblies and concerts. Here Jenny Lind made her American début. Many years ago the island was incorporated with the general area of the Battery by filling the intervening space with earth and rock; new buildings were erected, and the place was devoted to the purpose of landing steerage immigrants. In 1890 it ceased to be used as an immigrant depot, and was turned over to the Park Commissioners of the city of New York. The old fort is now used as a public aquarium.

Castle of Otran'to, The, by Horace Walpole. This story, with its natural personages actuated by supernatural agencies, is the prototype of that extraordinary series of romantic fictions which began with Anne Radcliffe, and was superseded only by the Waverley novels.

The reader's interest is aroused with the first page of the romance, and never flags. Conrad, son of Manfred, Prince of Otranto, about to marry Isabella, daughter of the Marquis of Vicenza, is found in the castle court, dashed to pieces under an enormous helmet. Now deprived of an heir, Manfred declares to Isabella his intention of marrying her himself; when, to his horror, his grandfather's portrait descends from the wall, and signs to Manfred to follow him. Isabella meanwhile, by the assistance of a peasant, Theodore, escapes to Friar Jerome. For this intervention, Manfred, now returned from his tête-à-tête with his grandfather's phantom, leads the youth into the court to be executed, when he is found to be Jerome's son, and is spared. At this moment a herald appears demanding of Manfred, in the name of Prince Frederick, his daughter Isabella, and the resignation of the principality of Otranto usurped from Frederick; who follows the proclamation, is admitted to the castle and informed of Manfred's desire to marry Isabella, when word comes that she has escaped from Jerome's protection. A series of ludicrous portents hastens the dénouement: drops of blood flow from the nose of the statue of Alphonso, the prince from whose heirs the dukedom has been wrested; unrelated arms and legs appear in various parts of the castle; and finally, in the midst of the rocking of earth, and the rattling of «more than mortal armor,» the walls of the castle are thrown down, the inmates having presumably escaped. From the ruins the statue of Alphonso, raised to gigantic proportions, cries, «Behold in Theodore the true heir of Alphonso.» Isabella, having been rescued at the critical moment, is of course married to Theodore.

This wildly romantic tale, published in 1764, was enthusiastically received by the public; who, as Mr. Leslie Stephen so well says, «rejoiced to be reminded that men once lived in

castles, believed in the Devil, and did not take snuff or wear powdered wigs."

Castle Peak, in Mono County, California, lying to the north of Mono Lake in lat. 38° 10′ N. It rises to about 13,000 feet above the sea.

Castle Rackrent, by Maria Edgeworth. This, as the author announces, is "an Hibernian tale taken from facts and from the manners of the Irish squire before the year 1782." The memoirs of the Rackrent family are recounted by Thady Quirk, an old steward, who has been from childhood devotedly attached to the house of Rackrent. The old retainer's descriptions of the several masters under whom he has served, vividly portray various types of the "fine old Irish gentleman." Sir Walter Scott has acknowledged that his original idea, when he began his career as a novelist, was to be to Scotland what Miss Edgeworth was to Ireland.

Cas'tlebar, Ireland, the capital of County Mayo. It is on the Castlebar River, 10 miles northeast of Westport; has infantry and cavalry barracks, and some linen manufactures. In 1641 occurred here the massacre of the English Parliamentary army in the Irish rebellion; in 1789 Castlebar was held for a fortnight by the French general, Humbert; and in 1846–7 it suffered greatly from famine. Pop. about 4,000.

Cas'tleford, England, a thriving manufacturing town in the West Riding of Yorkshire, on the Aire, here crossed by a bridge, 10 miles southeast from Leeds. The public buildings include the church of All Saints, several denominational chapels, schools, a market-hall, mechanic's institute, etc. There are numerous collieries in the neighborhood; and the town has extensive manufactures of glass bottles, earthenware, and chemicals. Pop. (1901) 17,382.

Cas'tlemaine, Australia, a municipal town in the colony of Victoria, in the county of Talbot, at the junction of Barker and Forest creeks, 78 miles northwest of Melbourne, on the Melbourne & Echuca R.R., with branch communication by Maryborough with Ballarat. The town is pleasantly situated and well laid out, and the buildings, both public and private, are of a superior character. The principal public buildings are the town-hall, the hospital, the supreme court, and the mechanics' institute. Castlemaine owes its importance to the mining industry carried on in its neighborhood. Pop. (1901) 6,082.

Cas'tlemon, Harry. See FOSDICK, CHARLES AUSTIN

Castlereagh, kăs'ĕl rā, **Robert Stewart,** VISCOUNT, English statesman: b. 18 June 1769; d. 12 Aug. 1822. He was educated at Armagh, and at St. John's College, Cambridge. He turned Tory in 1795, and next year became keeper of the privy seal; but he continued a steadfast supporter of Catholic emancipation. Still, he believed that emancipation with an independent Irish parliament would mean simply a transference of tryanny from the Protestant oligarchy to a Catholic democracy; hence, as chief secretary from 1797, he bent his whole energies to forwarding Pitt's measure of union. Transferred by the union from Dublin to Westminster, he accepted office in the Addington ministry (1802) as president of the board of control; but the true second era in his career was as war minister under Pitt from July 1805 to January 1806, and again under Portland from April 1807 to September 1809. His real greatness begins with March 1812, when, as foreign secretary under Lord Liverpool, he became the soul of the coalition against Napoleon, which, during the momentous campaigns of 1813–4, was kept together by him, and by him alone. He represented England at the congresses of Chatillon and Vienna in 1814–5, at the Treaty of Paris in 1815, at the Congress of Aix-la-Chapelle in 1818; and he was preparing to start for a congress at Verona, when, in a fit of insanity, he committed suicide with a pen-knife at Foots Cray, his Kentish seat.

Castlereagh, Ireland, a barony in the County of Down. The castle stands on the summit of a Danish rath, and was once the seat of an O'Neil. It is now the property of the Marquis of Downshire. The barony gives the title of viscount to the Marquis of Londonderry.

Cas'tleton, England, a village in the County of Derby, situated at the bottom of a rugged eminence, on which stands the ancient castle called Peak Castle, erected by William Peveril, natural son of the Conqueror. The houses are chiefly of stone. It contains the parish church, a fine specimen of the early pointed style; two Methodist chapels, and a free grammar-school. The inhabitants are mostly employed in mining; but many derive a subsistence from the manufacture of ornamental articles from spar. It is the scene of Scott's novel, 'Peveril of The Peak.'

Cas'tletown, Great Britain, a seaport and former capital of the Isle of Man, on Castletown Bay, 11 miles southwest of Douglas. Castle Rushen, now a prison, occupies the site of a Danish fortress of the 10th century, which was almost wholly demolished by Robert Bruce in 1313. The grounds of Rushen Abbey (11th century), near the station, are now market gardens. Near by is the small building where the House of Keys assembled for about 170 years. Brewing, tanning, and lime-burning are carried on. Near Castletown is King William's College, an Elizabethan pile, rebuilt after the fire of 1844.

Cas'tor and Pollux (the latter called by the Greeks Polydeuces), the sons of Tyndareus, king of Lacedæmon and Leda, or, according to some, of Zeus and Leda. The fable runs that Leda brought forth two eggs, one of which contained Pollux and Helen, the other Castor and Clytemnestra. Pollux and Helen, being the offspring of Zeus, were immortal; but Castor and Clytemnestra were begotten by Tyndareus, and mortal. Homer's account is that both Castor and Pollux were the sons of Tyndareus, and that Helen was the daughter of Zeus. The two brothers were inseparable companions, equally brave and spirited, and attached to each other with the fondest affection. Castor was particularly skilled in the art of breaking horses, and Pollux in boxing and wrestling. They were among the heroes of the Argonautic expedition, in which they acquired divine honors; for a terrible tempest having arisen on the voyage, and all with loud voices calling on the gods to save them, there suddenly appeared over the heads of Castor and Pollux two star-like meteors, and the tempest subsided. From this time they were the patron deities of mariners,

and received the name of Dioscuri («sons of Zeus»); and from them the name of Castor and Pollux was given to the fires that are often seen on the masts of vessels in storms, and which are electrical phenomena. After their return they released their sister Helen from the confinement in which Theseus had for some time held her. They were also among the heroes of the Calydonian hunt. They wooed the daughters of Leucippus, Phœbe and Hilaeira or Elaeira, and carried them off and married them. Having become involved in a quarrel with Idas and Lynceus, the sons of Aphareus, Castor killed Lynceus, and was slain by Idas. Pollux revenged his brother's death by killing Idas, but full of grief for the loss of Castor, he besought Zeus either to take away his life or grant that his brother might share his immortality. Zeus listened to his request, and Pollux and his brother alternately resided one day on earth and the other in the heavenly abodes of the gods. It is doubtful whether the ancients understood them as being together or separate in their alternate passage between the upper and the lower worlds. The former opinion seems to be the oldest; the latter to have gained ground subsequently. Temples and altars were consecrated to them. In great perils, especially in battles, the ancients believed that they frequently appeared to mortals as two youths on white steeds, in shining garments, with meteors over their heads; and then they were chiefly called Dioscuri. They were also represented side by side, either riding or standing, each holding a horse by the rein, with spears in their hands and stars on their heads. In the heavens the Dioscuri appear as one of the 12 constellations of the zodiac, with the name of Gemini (the Twins).

Castor, or **Castor'eum,** an odorous substance obtained from two glandular sacs connected with the sexual organs in both sexes of the beaver. In past years it was utilized for medical purposes, especially as a remedy in diseases of the uterus, and in the case of catalepsy, hysteria, and other spasmodic diseases. What little now reaches market is used as an ingredient of perfumes, but most of it is kept by northern trappers as a scent for baiting their traps, and is known as barkstone.

Castor Oil (*Oleum ricini*), the fixed oil expressed from the seeds of *Ricinus communis,* of the family *Euphorbiaceæ.* The oil is obtained from the seeds by various processes. The seeds are sometimes boiled and the oil skimmed from the water, or the oil may be taken up by solvents, such as alcohol, ether, etc. In the large manufacturing pharmacy houses in the United States the seeds are first warmed slightly and then passed between rollers, or other forms of pressure apparatus. The oil is collected and decanted, or mixed with boiling water and purified. The average yield of high-grade oil is from 40 to 50 per cent in weight. Care must be exercised in the amount of heating of the seeds, else a very active and acrid toxalbumin, ricin, which is present in the seed coat, is added to the oil. This tends to render the oil very griping in its action. Unscrupulous manufacturers have been known to add small quantities of ricin to adulterated oil. Seconds, or sorts, are inferior qualities of oil.

When fresh and pure castor oil should be a clear, colorless, viscid oil, with a faint, mild odor, a bland and unpleasant taste. Its specific gravity should be .950-970 at 60° F. It should be soluble in equal parts of alcohol; in all proportions of absolute alcohol, or in glacial acetic acid, and tested to exclude other mixed oils, is soluble at 60° F. in three times its volume of a mixture of 19 parts of alcohol and one part of water. This test will detect an admixture of over five per cent of other oils. Castor oil congeals at —18° F. The chemical structure shows castor oil to be composed almost entirely of ricinoleic acid. This is broken up in the intestines by saponification, and sets free the active agent of the drug's action. Castor oil is a reliable cathartic. It empties the bowel completely, largely by its stimulating intestinal peristalsis, and is probably the best cathartic for children with overloaded intestines. In intestinal fermentation and putrefaction accompanied by diarrhœa, it is excellent. It causes a number of loose, not very watery movements, attended with mild griping. There is a tendency to constipation following its use; hence, it is not of service in habitual constipation. As it is extremely disagreeable for many, its taste may be disguised by orange peel, or best in some aromatic frothy or carbonated mixture, as in coffee, soda water, or sarsaparilla soda water. From a teaspoonful to a tablespoonful is the usual dose.

Castor-oil Plant, Castor-bean, or **Palma Christi,** a tropical herb (*Ricinus communis*) of the natural order *Euphorbiaceæ,* a native of Africa and Asia, whence it has become distributed in warm countries throughout the world. In cool climates it is a half-hardy annual, but in frostless regions it is a perennial, often becoming a small tree. Its large palmate leaves, sometimes more than two feet in diameter, and its green or red stems, which in the central United States may attain a height of 12 feet, and in the tropics 30 or 40 feet, are very striking in flower borders and clumps of shrubbery. The unisexual flowers are borne in terminal racemes, and the female ones are succeeded by three-celled spiny capsules which explode when the seed is ripe, throwing the seed to a considerable distance. The seeds have long been employed for making castor oil, which is used for lubricating, for making sticky fly-paper, and in medicine. About half the demand of the American market is met by the crops grown in Kansas, Missouri, Oklahoma, and adjacent territory, but since the introduction of petroleum products the oil has a smaller use as a lubricant than formerly, and since the importation of various palm oils its use in soap-making has declined. It is also less popular as a medicine than it used to be. The crop is not considered a paying one. Castor-oil pomace (the oil cake after the oil has been extracted) is a highly valuable nitrogeneous fertilizer.

Castor'idæ. See BEAVER.

Castoroi'des, a gigantic, extinct, beaver-like rodent of the Pleistocene epoch in North America. It was as large as a black bear, and inhabited the cold, swampy, evergreen forests of the north, its remains being found chiefly in peat-bogs along with bones of the mastodon.

Castrameta'tion, the art of tracing out and disposing to advantage the several parts of a camp on the ground. See CAMP.

Castration, the removal of the testicles or ovaries of animals. Castration is usually performed to limit reproduction, to change the character of the working animal, making him more docile and easier to train, or to improve the quality of meat for eating, as in capons. In human beings castration is a surgical procedure and is usually performed for the relief of some irremediable or malignant disease. Thus in tuberculosis and cancer of the testicles, and in malignant or painful disease of the ovaries, the operation is justifiable. There has been a large amount of needless removal of the ovaries in women. The after results are often more annoying than the original disease.

The change produced in men by emasculation is highly remarkable, and assimilates their constitution in some respects to that of females. The elasticity of the fibres and muscles is weakened, and the cellular membrane becomes charged with a much larger quantity of fat; the growth of the beard is prevented; the upper part of the windpipe contracts considerably, and the castrate acquires the physiognomy and voice of a female. On the moral character it likewise appears to have some influence by weakening the intellectual faculties and rendering the subject unfeeling, morose, faint-hearted, and on the whole incapable of performing those deeds which require a high, magnanimous disposition. The most numerous class of castrates are those who are made such by the removal of the testicles. Another class are not deprived of the parts of generation, but have them ingeniously injured in such a manner as to leave them the faculty of copulating, but deprive them of the power of begetting. Juvenal mentions these as the particular favorites of the licentious Roman ladies. To the third class belong those who are entirely deprived of their genital members. They are used in preference, by the Turks, as keepers of their women. The castrates of all three classes are called eunuchs. Those of the third class, to distinguish them from the two others, are frequently termed entire eunuchs. The word eunuch is Greek, and signifies «guard» or «keeper of the bed.» The castration of adults produces some change in the disposition, but little in the bodily constitution. Even the power of engendering continues for a short time. According to the accounts of ancient historians, the Lydians, celebrated for effeminacy, castrated women. The latter are said to have used these beings as guards of their wives and daughters. With females the operation produces a completely opposite effect to that which it has on men. The sexual appetite ceases, a beard appears on the chin and upper lip, the breasts vanish, the voice becomes harsh, etc. Boerhaave and Pott relate modern instances of this kind. Among the evils which religious fanaticism has at all times produced, castration is conspicuous. The emperors Constantine and Justinian were obliged to use their utmost power to oppose this religious frenzy, and could put a stop to it only by punishing it like murder. The Valerians, a religious sect whose minds had been distracted by the example of Origen, not only considered this mutilation of themselves a duty which religion imposed on them, but believed themselves bound to perform the same, by fair means or foul, on all those who came into their power. In Italy the castration of boys, in order to form them for soprano singers, was in use for a long time. Clement XIV. prohibited this abuse, which, notwithstanding, did not cease till comparatively recent times, and in some Italian towns was not only suffered but exercised with such shameful openness that the practitioners gave public notice of their profession. In modern times severe laws were enacted against castration, and the custom is probably now extinct. Beings thus mutilated were common on the European stage. It is remarkable that so odious and unnatural an operation should produce the fine effect on the tones of the singer, which all had to acknowledge notwithstanding the disagreeable effect of the association.

Castrén, käs-trān', **Matthias Alexander,** Finnish philologist: b. Tervola 2 Dec. 1813; d. Helsingfors 7 May 1852. While attending, as a young man, the University of Helsingfors he conceived the project of tracing out the various detached branches of the Finnish races and languages, and presenting their ethnological and philological phenomena in one general view. Following out this idea he undertook in 1838 a pedestrian excursion through Finnish Lapland, and another in 1840 through the district of Karelia, with the view of studying the primitive language of that country, and enabling himself to translate therefrom into Swedish the great Finnish epic of the 'Kalevala.' This last work was accomplished by him after his return. He soon, however, resumed his travels, and for several years continued to prosecute his researches among the nations of the Arctic regions, both in Europe and Asia, including the Norwegian and Russian Lapps, and the Samoyeds of Siberia and the coasts of the White Sea. Naturally of a weakly constitution, and in a failing state of health, he was frequently obliged in addition to submit in the course of his journeys to the most extreme privations. Having returned home from his last journey to the Samoyeds, he was appointed in 1851 professor of the Finnish and old Scandinavian languages in the University of Helsingfors, but died before he had been able to add much more to his work — a martyr to the cause of science. Among his writings are: his translation of the 'Kalevala'; 'Elementa Grammatices Syrjænæ'; 'Elementa Grammatices Tscheremissæ'; and 'De Affixis Personalibus Linguarum Altaicarum'; besides travels and other works published after his death.

Castres, kästr, France, a town (ancient CASTRUM ALBIENSUM) in the department of Tarn, 23 miles south-southeast of Albi, on the Agout, which divides it into two parts — Castres Proper, north side, and Villegoudon, south side of the river. The public buildings include the hôtel de ville, formerly the episcopal palace, which contains a public library, and has a garden laid out on the plan of the Tuileries; three churches, one of them Protestant; two hospitals, a theatre, cavalry barracks, etc. The manufactures consist of fine cloths, coarse cloth for the troops, flannels, blankets, and other woolen goods, linen, glue, and black soap. There are also bleaching-grounds, dyeworks, tanneries, paper-mills, forges, and brass-foundries. Trade is also carried in in silk, cotton, liqueurs, and confectionery. Castres has a communal college and two seminaries. The town arose round an abbey of the Benedictines (which is said to have

been founded in the 9th century), and was already in the 12th century a place of importance. During the religious wars of the 16th century Castres was the scene of many conflicts. Louis XIII., to whom the town surrendered in 1629, ordered its fortifications to be razed to the ground. Pop. about 20,000.

Castries, Charles Eugène Gabriel de la Croix, shärl ė-zhān gä-brē-ĕl dė la krwä käs-trē, MARQUIS OF, French soldier: b. 1727; d. 1801. He entered the army, fought at Dettingen and in lower Alsace, became lieutenant of Languedoc and governor of Montpellier and Cette, and under Marshal Saxe commanded the army in Flanders, where he covered the sieges of Menin, Ypres, and Courtray, and ended the campaign with the battle of Courtray. He afterward fought at Fontenoy, Raocoux, and Laufeld. During the Seven Years' war he added greatly to his fame, was made lieutenant-general, and was dangerously wounded in the battle of Rossbach. In 1783 he was marshal of France, and emigrating in 1791 found an asylum with the Duke of Brunswick. He subsequently commanded the army of the French princes in Champagne, and countersigned the manifesto issued by Monsieur in 1793. In 1797 he formed, in conjunction with St. Priest, the so-called cabinet of Louis XVIII. at Blankenburg.

Castriota, käs-trē-ō'tä, George. See SCANDERBEG.

Castro, käs'trō, Augustin, Mexican poet: b. Cordova, Vera Cruz, 24 Jan. 1728; d. Bologna, Italy, 1790. He became a Jesuit priest and a teacher of philosophy, and was a skilful translator of classical authors. Among his original works in poetry are: 'Hernán Cortez' and 'Charts,' a guide for young poetic genius. His versions of Sappho, Euripides, Horace, Seneca, Milton, and Fénelon have received high praise from scholars.

Castro, Cipriano, Venezuelan military leader: b. Capacho, Venezuela, near the frontier of Colombia, about 1855. His parents were Spanish mestizos of the peasant class. He attended school in Capacho. While still a very young man he took an active part in politics in Capacho, as a Liberal. His first military exploit consisted in scoring a moderate success in the so-called "Battle of Capacho" (1886) against Morales, the local representative of the Lopez government. He remained a leader of the Liberal party in his state until 1892. In that year began Crespo's rebellion against Andueza. Castro, supporting Andueza's cause, was victorious in the battle of 15 May 1892, in Táriba; defeating Morales who now was under Crespo's command. In Caracas, however, the insurgents triumphed. Crespo entered the capital 6 Oct. 1892. Castro remained in control of Táchira and Merida, but before the end of the year withdrew across the Colombian frontier and bought a farm near Cúcuta in the department of Santander. For the next six or seven years he was a farmer and cattle-raiser. Invited by Crespo to take office as head of the custom-house at Puerto Cabello, he declined this offer, but promised Crespo not to join his enemies or attack his government. Andrade was Crespo's successor. Castro went to Caracas and called on the new president. Accounts of this visit differ. Castro's partisans assert that he again refused the tender of an office under the government; according to another version he was insulted, and left the Yellow House vowing vengeance. When he returned to his home some political friends and relations of Andrade's who lived in Cúcuta procured from the Colombian government an order for his arrest. For about two months he was in hiding; then he invaded Venezuela with only 60 men (23 May 1899). His old followers in Táchira joining him, in three days he collected a force of 1,500. The first skirmish was in the country between San Cristóbal and Rubio. In Las Pilas the commander of the government's frontier troops fell. At Zumbador about 2,000 men led by Morales were defeated. Castro laid siege to San Cristóbal, where Peñalosa was strongly entrenched. About 6,000 men under Fernandez were sent against him from Caracas. An indecisive engagement occurred. Then Castro left Fernandez in the rear, and marched toward the capital, defeating several government forces on the way. Andrade having fled the country, Castro entered the capital, opened the prison in which Hernandez had been confined for many months, and declared himself "jefe supremo"— neither president nor dictator, but "supreme military leader." The constituent assembly made him provisional president of Venezuela, 30 March 1901, and on 20 February 1902 he was elected president for the term of six years. But his duty has continued to be that of a miltary leader. Hernandez promptly revolted, and was put back into prison. Celestino Peraza was the next rebel; and after Peraza came Matos, who intrigued to gain the support of foreign governments. See VENEZUELA.

Castro, Guillen de, Spanish dramatist: b. Valencia 1569; d. Madrid 28 July 1631. He was at one time commander of a Neapolitan fortress. In his later years he lived in Madrid, and was on intimate terms with Lope de Vega. Castro's memory has been chiefly preserved by his authorship of 'Las Mocedades del Cid,' to the first part of which Corneille was indebted for the plot and many of the beauties of his celebrated tragedy. The other plays of Castro are badly constructed, and chiefly distinguished for their intensely national spirit.

Castro, Ines de, ē nĕs dā, Spanish lady: d. 1355. She was descended from the royal line of Castile. After the death of Constantia, wife of Pedro, son of Alfonso IV., king of Portugal, in 1345, Ines was secretly married by Pedro, whose mistress she had already been. As he steadily rejected all propositions for a new marriage, his secret was suspected, and the envious rivals of Ines were fearful that her brothers and family would gain a complete ascendency over the future king. At length Alfonso resolved to put Ines to death. The first time that Pedro left Ines, the king hastened to Coimbra, where she was living in the convent of St. Clara with her children. The arrival of Alfonso filled the unhappy lady with terror. She threw herself with her children at the king's feet, and begged for mercy. Alfonso was softened, but afterward gave his counselors permission to commit the murder, and it was executed that very hour. Ines expired under the daggers of her enemies. She was buried in the convent where she was murdered. Pedro took arms against his father, but soon became reconciled to him.

Two years later Alfonso died; the assassins had already left the kingdom and taken refuge with Pedro the Cruel of Castile. An exchange of fugitives was carried out. Of the three murderers of Ines, one escaped, but the other two were tortured in the presence of the young king Pedro at Santarem in 1360. Their hearts were torn out, their bodies burned, and their ashes scattered to the winds. Two years later, it is said, King Pedro at Cataneda declared on oath that after the death of Constantia he had obtained the consent of the Pope to his union with Ines, and had married her. The archbishop and Lobato confirmed the assertions of the king; and the Papal document to which the king referred was publicly exhibited. The king caused the body of Ines to be disinterred, and placed on a throne, adorned with the diadem and royal robes, and required all the nobility of the kingdom to approach and kiss the hem of her garment, rendering her when dead that homage which she had not received in her life. The body was interred at Alcobaça, where a splendid monument of white marble was erected, on which was placed her statue, with a royal crown on her head. The history of the unhappy Ines has furnished many poets of different nations with materials for tragedies, and the Portuguese muse has immortalized her through the lips of Camoens, in whose celebrated 'Lusiad' the history of her love is one of the finest episodes.

Castro, Joao de, zhō-owń' dā, Portuguese navigator: b. Lisbon 7 Feb. 1500; d. 6 June 1548. In 1538 he accompanied the viceroy Garcia de Neronha, his uncle, to India, as commander of a vessel, and in 1540 was in the expedition that explored the Red Sea, of which he made charts and scientific descriptions. His profound knowledge of mathematics and languages made these works of great value. They were published under the title of 'The Log-book of Don John de Castro, on the Voyage which the Portuguese made to the Red Sea.' After his return he was made commander of a fleet to rid the European seas of pirates; was appointed governor of India in 1545, in which office he defeated the great army of the Moors, under Adhel Khan, and completely subjugated Malacea. In 1547 he was commissioned viceroy of India, but died shortly afterward.

Castro, Jose Maria, hō-sā' mä rē'ä, Costa Rican statesman: b. San Jose 1 Sept. 1818. He was educated at the University of Leon, Nicaragua, and held positions under the government of Costa Rica. In 1846 he was vice-president and in 1847 was elected president. After Costa Rica withdrew from the Central American states, he resigned the presidency, but held diplomatic positions. From 1866 to the rise of the Jimenez government (1868) he was again president.

Castro Urdiales, a seaport town of Spain, on the Bay of Biscay, in the province of Santander. It was sacked by the French in 1811, but has since been neatly rebuilt. A ruined convent of the templars is in the vicinity. It has a safe harbor, and extensive fisheries. Pop. (1900) about 13,000.

Castro-Del-Rio, a town in Spain, Andalusia, 16 miles southeast of Cordova, on a slope above the Guadajoz. The more ancient portion is surrounded by a dilapidated wall, flanked with towers, and entered by one gate, which was defended by an Arab castle, now also ruinous. The modern portion is outside the walls, and extends along the foot of the hill on its north side. The most of the streets are wide and regular, lined with well-built houses and handsome public edifices. The church is large and handsome, and there are also several convents, two colleges, primary schools, hospitals, and manufactures of linen, woolen, and earthenware. Pop. (1887) 11,290.

Castrogiovanni, or **Castro Giovanni** (anc. ENNA), a city of Sicily, in the district of Caltanisetta, on a plateau in the centre of the island, 4,000 feet above the sea. The climate is healthy, the soil fertile, and water abundant. The old feudal fortress of Enna is the chief edifice. It contains also a cathedral. It was the fabled birthplace of Ceres, and the site of her most famous temple. About five miles distant is the lake of Pergusa, where Proserpine, according to the poets, was carried off by Pluto. During the first servile war the insurgent slaves made Enna their headquarters. It was captured by the Saracens in the 9th and by the Normans in the 11th century. Pop. 19,800.

Cas'trum Dolor'is, a Latin term signifying castle of grief, has a different meaning from *catafalco.* The latter is used to denote an elevated tomb, containing the coffin of a distinguished person, together with the tapers around, ornaments, armorial bearings, inscriptions, etc., placed in the midst of a church or hall. The *castrum doloris* is the whole room in which the *catafalco* is elevated, with all the decorations. The sarcophagus, usually empty, is exposed for show upon an elevation covered with black cloth, under a canopy surrounded with candelabra. Upon the coffin is laid some mark of the rank of the deceased, as his epaulette or sword, and, when the deceased was a sovereign or a member of a ruling family, princely insignia are placed on surrounding seats. The French call the *castrum doloris, chapelle ardente,* sometimes also *chambre ardente;* but the latter has also a separate meaning.

Castuera, käs-too-ā'rā, Spain, a town in the province of Badajoz, near the right bank of the Guadalefra. Most of its streets are straight, clean, and well paved. It has two squares, lined with substantial houses; the principal one contains the town-hall, prisons, and spacious modern parish church. The inhabitants are engaged in weaving, making earthenware, tiles, bricks, shoes. Trade is carried on in cattle, wool, wine, grain, and oil. Pop. 7,133.

Casualty Insurance. See INSURANCE, CASUALTY.

Casuarina, kăs-ū-ą-rī'na, or **Botany-bay Oak,** the single genus of the natural order of *Casuarinaceæ,* or cassowary-trees. There are about 30 species, natives chiefly of Australia. They are jointed leafless trees or shrubs, nearly related to the birches, having their male one-stamened flowers in whorled catkins, and their fruits in indurated cones. Some of them produce timber called beefwood, from its color. *C. quadrivalvis* is called the she-oak, *C. equisetifolia,* the swamp-oak.

Cas'uistry, the science or art of determining cases of conscience and the moral character of human acts; so called from *casus conscien-*

tiæ, a case of conscience. Wherever the question rises, Is such an act allowable by moral law? there is a case of conscience and matter of casuistry, and in deciding the question for himself, as everyone habitually does, everyone is a casuist. But in current usage a casuist is one who, skilled in the prescriptions of the divine moral law and its interpretation whether by lawgivers, moralists, or theologians, studies either suppositions or actual cases of conscience and judges whether a given act, or even a given thought is consistent with or in violation of moral law — for, unlike the civil lawgiver or the ministers of civil law, the casuist must determine the moral character of thoughts no less, or rather more, than of acts. The professional casuist is inevitable in the system of the Catholic Church, where the minister of religion, in his capacity of *confessarius* or confessor must be the counselor and director of penitents and resolve for them questions of guilt or innocence, questions touching the obligation to restitution, for example of goods, or reparation of damage to a neighbor's reputation by slander; granting or withholding absolution according to the merits. For the minister of the sacrament of penance acts under Jesus Christ's commission, whose sins ye shall forgive, whose sins ye shall retain, shall be forgiven or retained; and to execute that commission the minister of the sacrament must decide for himself and the penitent the moral character of the acts. The science or art of casuistry has doubtless been carried to extraordinary lengths; but though the questions which it treats are such as touch individually and most intimately daily and hourly the many millions of souls who resort to the confessional, the works of writers on casuistry, though voluminous, would count as a scant armful compared with only one part of the works contained in a law library — those which record the decisions of the civil courts. It is true also and inevitable that casuistry like law lore is often employed as a means of escaping from legal penalty or of quieting the sense of guilt. As there are lawyers who for a fee will defend any cause however defenseless morally, even to the extent of working injustice — loss of property, loss of reputation to the party opposite — so there are casuists who by their overinclining to an indulgent interpretation of the divine moral law, release or cut the nerve of moral responsibility, administer an opiate to conscience.

Probabilism is the name given to the doctrine which declares to be lawful *in foro conscientiæ* an act the moral correctness of which is affirmed by any moral theologian of weight (*doctor gravis*); or, as defined by Liguori, a probable opinion is one which rests on a solid foundation (*fundamento gravi*) both of reason and of authority, so that it is able to move the assent (*fleetere assensum*) of a prudent man, though with fear regarding the opposite. But a writer in a great encyclopædia, who regards probabilism as "the most remarkable doctrine they (the casuists) promulgated — a doctrine which it is hard to believe that any one ever ventured to assert" teaches that "according to probabilism" "any opinion which has been expressed by 'a 'grave doctor' may be looked upon as possessing a fair amount of probability, and may, therefore, be safely followed, even though one's conscience may insist upon the opposite course": the last clause is gratuitous and has no warrant in the teachings of Catholic moralists, who unanimously hold that an act done in defiance of conscience, even be it a plainly erroneous conscience, is a sin.

Viewed in the abstract, the rule of the probabilists is not an unreasonable one: it is acted upon daily by whoever, doubting his own judgment, asks counsel of others whom he regards as trustworthy advisers, even though they be not grave doctors (*graves doctores*). It is admitted that some of the probabilists, even the greatest of them, as Escobar, Suarez, Busembaum, did not always guard the doctrine against misconstruction, and gave occasion for views of moral obligation which were too lax: but the ecclesiastical censure has fallen upon such erroneous teachings, without discrediting for Catholic moralists the principle of probabilism. Let any other school of moral teaching set to itself the same task which confronts the moral theologian of the Catholic Church, that is, to define with precision the moral character of every act, every thought, every imagination that has relation to the moral law, and it will be seen whether probabilism must not have a place in its system.

Ca'sus Bel'li, the material grounds which justify (or are alleged by one of the parties concerned to justify) a declaration of war (q.v.). The *casus belli* is not seldom a very trifling one, and does not necessarily indicate the real *causa belli* or cause of the war.

Cas'well, Richard, American lawyer: b. Maryland 3 Aug. 1729; d. 20 Nov. 1789. He removed to North Carolina in 1746; was president of the Provincial Congress which framed the State Constitution (1776), and first governor of the State, three times re-elected; was also a delegate to the convention which framed the Federal Constitution in 1787.

Cat (*Felis domesticus*), a well-known domesticated quadruped of the order *Carnivora*, the same name being also given to allied forms of the same order. Some have thought that the domestic breed owed its origin to the wild cat; but there are considerable differences between them, the latter being larger, and having a shorter and thicker tail, which also does not taper. The domestic cat belongs to a genus — that which contains the lion and tiger — better armed for the destruction of animal life than any other quadrupeds. Its short and powerful jaws, trenchant teeth, cunning disposition, combined with nocturnal habits (for which its eyesight is naturally adapted) and much patience in pursuit, give it great advantages over its prey. It is characterized by six incisor teeth above and below; two canine teeth in each jaw, powerful and formed for tearing; molar or cheek teeth, four in the upper jaw and three in the lower, thin, pointed, and wedge-shaped, formed for cutting. The head is large, round, and wide; the eyes have the pupil often oblong; the tongue has strong horny papillæ, directed backward. The feet are formed for walking; the toes are five in number on the fore feet, and four on the hind feet, armed with strong, sharp, and hooked claws, retracted when the animal walks. The intestines are very short, as in all animals living almost exclusively on animal food. The cat in a degree partakes of all the attributes of its race. Its food in

a state of domestication is necessarily very various, but always of flesh or fish if it can be obtained. Instances of its catching the latter are known, though usually the cat is extremely averse to wetting itself. It is a very cleanly animal, avoiding any sort of filth, and preserving its fur in a very neat condition. Its fur is easily injured by water on account of the want of oil in it, and it can be rendered highly electric by friction. The cat goes with young for 63 days, and brings forth usually from three to six at a litter, which remain blind for nine days. It is usually regarded as less intelligent than the dog, but this is by no means certain. It has a singular power of finding its way home when taken to a distance and covered up by the way. The wild cat (*Felis catus*) is still found in various parts of Europe and western Asia, chiefly in forest regions, making its lair in hollow trees or clefts of rocks. It is a very fierce animal. There are a number of other animals, of similar size and habits, known as cats, such as the fishing-cat (*F. viverrina*) of Bengal and eastern Asia, the leopard cat (*F. bengalensis*) of northern India and southeastern Asia, the marbled cat (*F. marmoräta* of the same region, the rusty-spotted cat (*F. robiginösa*), a small Indian species, etc. For varieties of the domestic cat see CAT IN AMERICA.

Cat, Domestic, The. There is little doubt that the influence of the domestic cat upon American civilization has received less consideration than it deserves, for a great deal of the advance in agriculture, as well as of the spreading out over the vast woodlands and prairies of America, has been made possible by this much abused and misunderstood animal. For places suddenly thrown open to settlement the cat is often one of the first things sought, is one of the first of the necessary household gods, and goes in with the cooking-stove and the dish-pan. The reason for this is, that on our great prairies mice are found in countless thousands. The settler, not being near a town, buys his goods by the wagon-load, and, being able to go to the base of supplies only once or twice a year, stores his food in barrels and sacks, enough, perhaps, for six months ahead. This opportunity is not lost by the mice, which, swarming indoors out of the prairie grass, find ideal conditions; abundance of food, warmth, shelter, and comfort. If the simple eating of the food ended the trouble, it would not be so bad, but field-mice, imbued as they are with the instinct of storing everything, have a knack of mixing different things together — the rice with the coffee, sugar with both, etc., until there is a *potpourri* that no one can separate, and cooking is made impossible.

After such happening the settler speedily seeks a cat, and the prices paid would astonish those who think cats merely a nuisance. How much food cats have saved, how much property they have guarded from destruction, what plagues of vermin they have kept in check, from the time this country was first settled, it is impossible to compute. But for their sleepless vigilance the large cities would quickly be overrun with rats and mice. How indispensable their service is may be seen in the condition of farms in the British Isles, rendered useless by rats and mice, because the cat, as well as the hawk and the owl, is suppressed to make way for the game preserve, to afford the pleasure of shooting for a few weeks, or perhaps, only a few days in the year.

The cat, then, is a necessary adjunct to our civilization, a factor and an institution to dislodge which would imperil our status as a nation; and until a substitute can be found the cat is an economic necessity in our daily life that cannot be done away with without upsetting the balance of nature greatly to our disadvantage. This fact is recognized by the government, which appropriates money every year for the maintenance of cats in the post-offices and other public buildings of the larger cities, in order to keep down the vermin that would gnaw holes in mail-sacks and destroy public records and other property. It is recognized in the national printing-office of France, where vast quantities of paper are stored, and where an army of cats is retained to keep the mice in check. In Vienna it is regarded as a part of good municipal government to take care of the cats. The United States government has systematized its cat service in public institutions, and in Pittsburg a certain strain has been bred to live in cold-storage houses, and is developing characteristics peculiar to this kind of life. In warehouses, corn-cribs, barns, mills, and wherever grain or food is stored, cats must be kept.

Having shown, to a limited extent, the necessity of keeping cats, we will now turn to the advance made in their care and selection; for the arousing of interest which has come from the scientific breeding of cats for exhibition purposes is destined to lift the family to its proper place in public economy, where the breeding and keeping of them can be properly regulated, their health cared for, the diseased put out of the way, and the family, as a whole, elevated to the position to which its beauty and usefulness entitle it. To be effective, they must be taken care of, for well-fed cats are the best mousers.

The origin of the domestic cat is shrouded in mystery, and to the Egyptians we have to turn for such of its early history as is reliable. The Egyptians being an agricultural people, and the raising of wheat their main industry, they quickly grasped the fact of the usefulness of the cat; and the earliest ones were probably obtained by taming kittens of the native species (*Felis caligata*), and to these we most likely owe the greater part of our short-haired cats. Possibly when the Aryans made their pilgrimage from Asia they brought specimens of the short-haired, domestic cats from India, for there are, at the present day in India, domestic cats that are not likely to have any Egyptian blood in their veins. Whatever the origin of the domestic cat, it is probable that in comparison to the date of the domestication of the horse, dog, ox, etc., the advent of the cat to our firesides is comparatively recent. Though cats appear on tombs, or as illustrations, as far back as 1600 B.C., this date may be said to be comparatively recent if we consider the question in relation to the probable date of the domestication of the dog. The Egyptians loved their cats, understood their usefulness, and ended by worshipping them as sacred animals, and giving them a careful burial, for the mummies of cats, beautifully wrapped in expensive fabrics, are constantly coming to light when excavations

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The origin of the domestic cat is shrouded in mystery, and to the Egyptians we have to turn for much of its early history as is reliable. The Egyptians being an agricultural people, and the raising of wheat their main industry, they quickly grasped the fact of the usefulness of the cat; and the earliest ones were probably obtained by taming kittens of the native species (*Felis caligata*), and to these we most likely owe the greater part of our short-haired cats. Possibly when the Aryans made their pilgrimage from Asia they brought specimens of the short-haired, domestic cats from India, for there are, at the present day in India, domestic cats that are not likely to have any Egyptian blood in their veins. Whatever the origin of the domestic cat, it is probable that in comparison to the date of the domestication of the horse, dog, ox, etc., the advent of the cat to our firesides is comparatively recent. Though cats appear on tombs, or as illustrations, as far back as 1900 B.C., this date may be said to be comparatively recent if we consider the question in relation to the probable date of the domestication of the dog. The Egyptians loved their cats, understood their usefulness, and ended by worshipping them as sacred animals, and giving them careful burial, for the mummies of cats, beautifully wrapped in expensive fabrics, are constantly coming to light when excavations

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EUROPEAN WILDCAT *(Felis Catus)*

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are made in and around some of the buried cities of Egypt. The Greeks and Romans, about whom we have a clearer knowledge, and whose times seem to come nearer our own, appear not to have paid much attention to cats, and they have left us nothing in their literature, inscriptions, or paintings that leads us to any knowledge of the history of the domestic cat. There seems to be no record that the cat became domesticated in France or in England before the 9th century, but at that time it was considered of great value and was a regular object of trade.

American interest in the cat is often said to have originated within the last eight years, that is, since the advent of exhibitions and the taking up of the cat cult by the public. This impression is not borne out by facts, for we have exhibitors who have intimately studied cats, have bred and raised them, and have cared for them for over 50 years, and cat-shows were held in Maine between 1860 and 1870, even before the great exhibition instituted in London by the well-known animal painter, Harrison Weir, in the year 1871. But cat-shows in America were not known outside of Maine until one was held in the Madison Square Garden, New York, in 1895. The exhibitions in England have gone on from Mr. Weir's first show up to the present time, so that the marking epochs in modern cat history may be dated from the Crystal Palace show in 1871, and the New York show in April 1895. From these shows has arisen what may be described as a cult, or in some ways an industry. Numbers of individuals, principally women, have taken up the cat as a partial means of livelihood, selling those they rear by exhibiting them to the public, the outcome of which has been the production of different colors, strains, and families. Clubs have arisen for the care and maintenance of exhibitions; registers and stud-books have been started; and the importation of rare varieties or valuable specimens is duly recognized by our government as one of the many things to be considered and provided for in a tariff schedule.

The varieties or breeds recognized in shows are the Persian, Siamese, Abyssinian, and ordinary domestic short-haired cats. The Persian and Angora may be said to be the same cat, though distinctions were drawn in old days; but these were very indefinite, and at the present time we draw up rules and regulations for two large groups, the Long-haired Cats and the Short-haired Cats, and these are judged by points and classified by color distinctions. Angora is a small place, and comparatively few cats could have come from there, but many have come from other parts of Asia. Taking the long-haired division first, because commercially it is the most prominent, the judge requires that the cat shall be short in body with a short tail and short legs, the latter shorter in front than behind. The chest should be wide, the loin square and firm, the bones of the legs well developed, and the frame sturdy. The head that corresponds with this formation and is required, is a broad, round head with short, wide nose, eyes large and round, and set well apart. The ears, a most important feature, should be as small as possible and placed on the side of the head, the base of the ear being narrow, not gaping wide open, with a tuft of hair at the apex. This standard is more or less based upon original imported specimens from Asia; and if studied it will be found that the probable ancestor of our domestic long-hairs, *Felis manul*, or the wild long-haired cat of the interior of Asia, is built on these lines. The colors most valuable and most approved are the light silvers, smokes, blues (or slate color) white, black, orange, cream, and tortoise-shells; and the tabbies of different colors are also favorites. The tabby-cat is a cat that has a light ground-color and is spotted, barred or striped with darker color, and the word "tabby" has no reference to the sex of the animal. The name "tabbie" is derived from Atab, a street in Bagdad celebrated for its manufacture of watered or moiré silks, which in England were called *atabi* or "taffety." The most usual colors in tabby-cats are yellow, marked with orange or red, making what are called orange tabbies; yellow brown, marked with black, making the brown tabbies; gray, marked with darker stripes, giving us the gray tabbies; and pale silver, marked with black or a sort of dark blue verging on black, from which we have the silver tabbies. The great feature required in tabby-cats is that the ground-color should afford as distinct a contrast to the stripes, bars, or spots, as possible; the colors should be vivid and the marks very plain. There are spotted tabbies, and in these the spots must be round, clear, and distinct; but we seldom see a good one of this variety unless it came from India, the home of the best spotted tabbies. The solid-colored cats are the whites, blues, blacks, and smokes; although recently the silvers, creams, and oranges have in a few instances almost attained perfection in being without marks or foreign color. The tortoise-shell cats are black, red, and yellow; when accompanied by white, the patches are more clear and distinct, and this feature is what is aimed at. Tortoise-shell males are almost unknown, and orange females are very scarce.

The eyes of a cat are an important feature, and should be large, round, and pleasant in expression. Although color of eye is a great feature, many judges prefer large, well-placed, pleasant eyes to those that are more correct in color but badly placed, or are small and mean in expression, or give the cat a sour look. The color of eyes required may be briefly summed up as blue (as deep as possible) for a white cat; emerald-green for light silver, or chinchillas, as they have been called; and yellow to orange, as deep as possible, for all other varieties. The color and beauty of the cat's eyes vary according to the state of health, the light, and the time of day, and judges have to be careful in this matter. The body-colors can be defined as white, as pure as possible; black, deep and glossy; blue or slate, sound and pure from root to tip of hair, showing no light shadings or light under-color; smoke, a deep plum-color, silver undercoat; ruff, and stomach; cream, light fawn or cream color; orange, whether marked or unmarked, should be as rich and strong as possible. The tortoise-shells marked with clear distinct patches, clean-cut and free from each other. The fur of the long-haired cats should be fine, long, silky, and glossy; wooliness is deprecated, but is more inclined to appear in certain colors, such as orange and cream; and blacks may have a rather coarser texture of coat if they make it up in

color. But in whites, silvers, blues, smokes, and in brown tabbies there can be no excuse found for anything but exquisite quality.

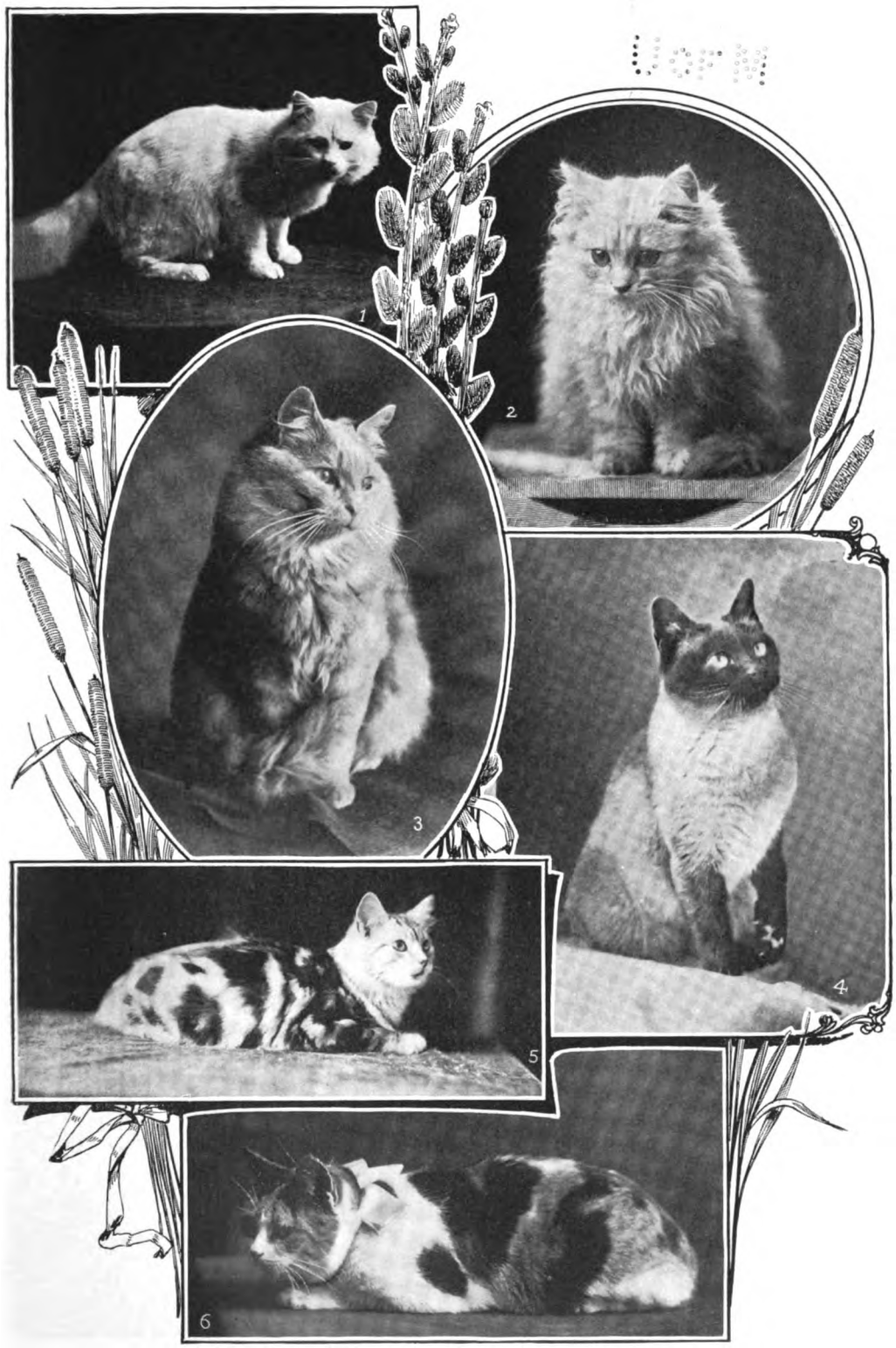
In the short-haired division we must consider our old fireside friend first, and coloration in this variety is much the same as in the long-hairs, though we do not often find smokes or so many silvers, and the blue-eyed whites have probably been bred from the long-haired cats. But as to color, color of eyes, and classification, the rules specified for long-hairs fit the short-hairs except that the tabby-cats are more distinctly marked and more brilliant, as the colors are not clouded or mixed by the length of the hair. White cats with blue eyes are generally deaf, but not always. The short-haired cat is rather different in formation to the long-haired cat, the face is more angular, or rather the nose may come to a finer point, though its cheeks should be well developed. The eyes are differently placed, yet should be full and large, the ears larger, closer together, more toward the top of the head, wider at the base, and more pointed at the apex. The body should be moderately long, slender, and elegant. The great thing to avoid in all cats is coarseness, and size alone is not a recommendation.

The Siamese is a distinct variety which comes from the palace of the king of Siam or from a few families of nobles. These cats are conceded to be the most intelligent and companionable of all cats, but having been much inbred, are not easily reared and do not increase very fast. The climate of California suits the Siamese cat, and the variety is found there in fair numbers and doing well. The points valued in this cat are a rather small and flat head, a small and elegant body of a light fawn or biscuit color, with chocolate-colored legs, mask, and tail. The more decided the contrast — that is, the lighter the body color and the darker the points — the better. The Siamese are much appreciated as show-cats. Chocolate-colored cats of this variety are found and are valuable. The fur most approved is very fine and glossy, resembling beaver. The eyes are blue, the color as rich as possible.

The Manx cat makes a distinct species in our exhibitions, and is classed by itself. Besides the absence of tail, which is the distinguishing feature of this cat, a different formation of body is required; namely, that the fore legs should be short and the rump rise as abruptly as possible, making the hind legs longer than the fore legs, so that the cat seems to jump forward like a rabbit, and is sometimes called a rabbit-cat. The head should be neat, round, and rather small, and the cat itself small, short, and compact. The Manx cat may be of any of the recognized colors. There is a distinction between this variety and our other domestic cats. Gambier Bolton who studied the question, and traveled to collect specimens for the British Zoological Society, coincides with the naturalist Kempfer, and recognizes a strong likeness in these cats to those of the islands in the East, the Malay peninsula, Japan, China, and lands contiguous. All the cats in those parts, even the Siamese, seem to have peculiar formations of the tail, whether cut short, forked, kinked, or otherwise. These cats are smaller; there are differences in the call or language, ways, and character, that have been observed by these students. The origin of the Manx cat is now attributed to the arrival of these cats on the Isle of Man from ships belonging to the Spanish Armada that were wrecked there. These cats were most probably previously brought from Japan or other parts of eastern Asia, for cats now brought from Japan are exactly like our Manx. A cat with his tail cut off, showing a stump, does not constitute a Manx cat for the student.

Other cats found in show-rooms are the Abyssinians, but they do not make much headway and have not yet arrived in America. The males are generally darker than the females, and the color of these cats should be a deep brown ticked with black, somewhat resembling the back of a wild rabbit, with a distinct black band running down the back to the tip of the tail. The inner sides of the legs and belly are more of an orange tint than the body, and are marked in some cases with a few dark patches. The eyes are deep yellow, tinged with green; nose dark-red, edged with black; ears rather small, dark-brown, with black edges and tips; and the pads of the feet are black. Attempts have been made to copy this cat, and it has been attempted to exhibit, as such, slightly marked ordinary short-haired cats, but they are not the genuine breed. The absence of tabby-markings is the point most sought and prized, and if kept pure the characteristics of these cats are peculiar. The Abyssinian cat has never been very numerous at exhibitions, perhaps because it is a short-haired cat, though short-haired cats, when good exhibition specimens, bring large prices. Cats marked with white have not found much favor in British exhibitions, but have always been popular at American shows, and Madame Ronner, the great French painter of cats, usually depicts her cats — that is, the dark ones — with some white patches. If cats are marked with white, they are preferred with four white paws and a white face; that is, the white starting in a sharp point between the eyes, spreading out onto the lips, making a triangle with the apex on the forehead, and continuing thence down the chest, but not spreading to the shoulders or going round the neck or over the back. Any marking, in an "any other class," that is regular and even, and forms anything like a regular pattern, should be recognized and encouraged by a judge; besides which, any effort made to bring out a new variety or color must be taken note of and encouraged. There is now a tendency to encourage Dutch marked cats, which means black patches on the cheeks, a white blaze up the face, joining a broad, white belt which goes completely round the cat halfway between the ears and tail. Of the cats indigenous to the American continent, which might be suitable for domestication, few have been tried in a domestic way, and the species that inhabit this country are not many. I have seen the wild cat or gray lynx, at shows, behaving in the most exemplary manner. Having been brought up from infancy by children, and perfectly tame, it was more at ease in a large show-room, and not nearly as nervous as the ordinary feline. So that if it were not for the size of the creature, its possibilities as a domestic animal were certainly good; but unfortunately our time does not seem to be destined to take in hand or give us any fresh species of domesticated animal; what we have are handed

CATS.



1. White Persian.
2. Light Silver.
3. Cream Persian.
4. Siamese.
5. Silver Persian.
6. Short Hair Tortoise Shell.

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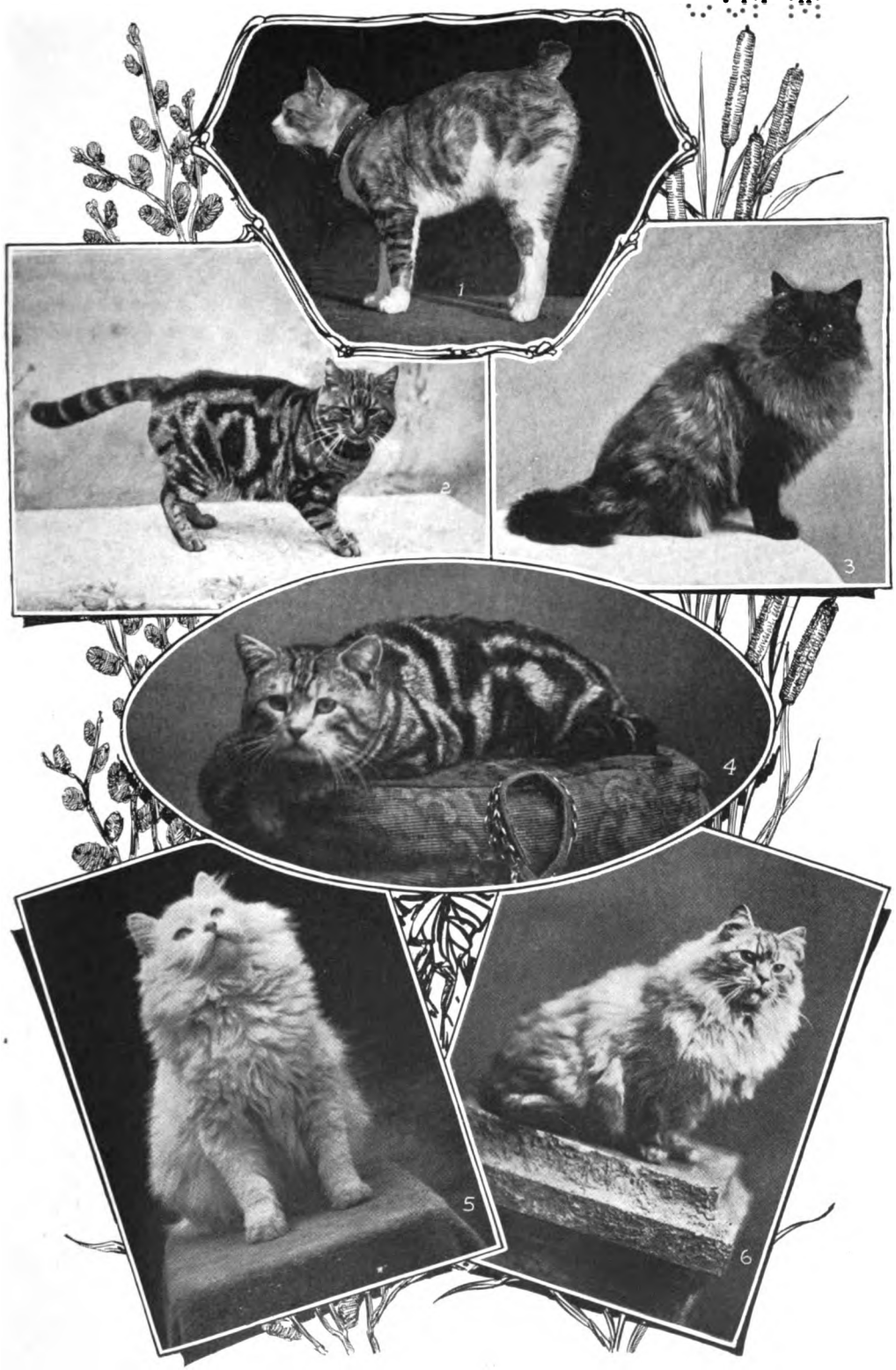

1. Manx.
2. Brown Tabby.
3. Smoke Persian.
4. Silver Tabby.
5. White Persian.
6. Shaded Silver.

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down through the ages. In this particular we are not original, for we destroy more often than we create, and we seem to have no time for trying to subdue or lead into bondage any new varieties of mammals. The puma, cougar, or mountain lion ranges over the whole of North and South America, but is too large for domestic purposes; yet it has never been aggressive against man, and, if history is to be thoroughly credited, was quite the reverse with early settlers till driven to exile and filled with fear by man himself. The ocelot is one of our most beautiful varieties, and varies somewhat in color, with sometimes a gray body-color, but more often yellow. It is clearly marked with dark color in spots, bars, and splotches, and is very handsome, but larger and more powerful than the domestic cat. These cats have been taken when young, and reared; and although comparatively tame and sociable till about a year old, they then become savage and impossible and have to be caged or killed.

A very pretty cat that has been exhibited in America is the margay from Central and South America, where it inhabits the woods. I have handled this cat at a show and found it very tame and with a passion for being caressed. The margay is light red or orange, beautifully and regularly spotted with small black spots, the ears small, round, and pointing forward, whitish-gray at the backs, edged with black. It is a small cat, very handsome and refined, and if the effort could be made to obtain some more of the species these cats would be a very valuable addition to our varieties and to our home circles. Geoffroy's cat is another small spotted cat, of which a few have been introduced into England, but it is too early to state what the future increase may be. The pampas cat is another feline not amenable to domestic life.

As a rule our best white cats with blue eyes come from India and some of the best are brought from Tibet. In crossing the Himalayan Mountains with these cats carriers slit their noses to enable them to breathe with greater ease the rarified atmosphere of the high altitudes. Cats with slit noses are much valued. As to cats coming from this place or that, such as Persia, Angora, etc., a good deal of proof is required before any particular claim can be accepted. I have failed to find any long-haired cats at Teheran, the capital of Persia, and Angora, as I have said, is but a small place. We probably obtained many of our long-haired cats from around the Persian Gulf, and more from India, many of which come down from the interior of Asia with the Arab horse-traders. Cats vary in their adaptability to changes of climate, and no doubt to this factor we owe what we have and what breeds we can retain and perpetuate. The Siamese soon succumbs to dampness, but the long-haired cats, in some cases, took to the climate of Maine early in the century, when brought from the East. They bred extensively, and increased and became an article of commerce to the large cities, long before these cities held shows. These cats went by the name of Angoras, and in fact the ordinary nomenclature of the country defines all long-haired cats as Angoras. The Maine cats were often carelessly bred, and when shows commenced and competition came they had to give way to the more finely bred English cats, but in other cases they held their own and the blood has been perpetuated. The Maine cats are found in all colors, and some are very big and strong, but these have been probably crossed with short-haired cats, and a great deal of hybridizing has been done even in England. There is a Russian long-haired cat, but it has not gained much favor, being solitary in its habits, unsociable in character, coarse in body and fur, and dingy in color. A few have been brought from Persia, but they had the faculty of attaching themselves more to other cats than to their owners. They are originally the same cat as the Asiatic,—that is, the Persian or Angora; and the first long-haired cats must have been brought over by sailors and travelers from the East. All long-haired cats seem to have a common origin in Pallas' cat (*Felis manul*).

Another cat that has created a great deal of interest is the Maltese. This cat is hard to account for, but should be blue or slate in color and greatly resembles what in Great Britain is called the Russian or Archangel cat, specimens of which have often been brought from Russia; but lately quite an influx of blue cats has come from Iceland. Whether cold winters are calculated to develop blue cats I do not know, but it is sufficiently evident that northern climates have produced most cats of that color. Blue cats are not numerous in Great Britain, although they are becoming more so by introduction. Here in America we have plenty scattered all over the States, but how they gained their name of Maltese I have never been able to discover, for there is no blue cat indigenous to the island of Malta. Probably the cats were brought there in early times from the same source whence the English now obtain theirs, and, the color being peculiar, these cats were selected, or by superior hardiness they may have selected themselves. However, many people who are not cat-exhibitors or who do not know much about cats scientifically keep their short-haired blue "Maltese" and are proud of them. The Chartreuse monks had blue long-haired cats many years ago.

Some writers have told us that long-haired cats are less affectionate than short-haired cats. This is a mistake, although long-haired cats, on the average, are more intense, more nervous, more highly strung, more pugilistic, and have more pluck and daring than the short-haired cats. The cat has great intelligence; in fact, is one of the most intelligent if not the most intelligent, of the domestic animals, and it is this fact that precludes the possibility of teaching the average cat tricks. For the cat sees through the manœuvre, and refuses to be made a fool of. In respect to memory they are phenomenal and far exceed the average dog in this quality. Their powers of conversation are well developed, accompanied by delicate inflexions of the voice that need to be known to be understood. Dupont de Nemours says: "The cat has also the advantage of a language in which the same vowels as those pronounced by the dog exist, with six consonants in addition, m, n, g, h, v, and f." It requires study to get to know cats, and Rouvière, the actor, said that no one could really understand a cat unless he himself became one. A cat, of all the domestic animals, has retained the greatest part of its wild nature and traits, and the easiest way to get at a cat is by kindness and by trying to learn cat ways.

A cat never gives in to coercion. Liberty is the last thing it will resign; and often it will not resign that except in exchange for death. The cat should be used as the emblem of liberty.

It is a mistake to suppose that a cat cares only for places, for it is only the innate conservatism of the animal that gives this impression. Regularity is the keynote of its existence and what it does one day it likes to do the next; and certainly to places where it has been reared and has lived it shows great attachment. But on the contrary there are cats that would settle down anywhere, that have crossed and recrossed the Atlantic Ocean, and have lived quietly in any locality their owners chose. A cat is one of the finest mothers on earth.

The fortunes of the cat are now more or less regulated by clubs and associations, and there are homes, hospitals, and refuges in many places and in many lands. The principal clubs are the National Cat Club founded in 1887, with headquarters in London; the Scottish Cat Club, founded in 1894; the Cat Club, London, founded in 1898; the Northern Counties Cat Club, the Silver and Smoke Persian Cat Society, the Siamese Club, and the Orange, Cream, Fawn, and Tortoise-shell, founded in 1900; the Black and White Club, the Blue Persian Society, the Chinchilla Cat Club, the Short-haired Cat Club, the Midland Counties Cat Club, the British Cat Club, and the Manx Cat Club, founded in 1901. All the above are in Great Britain, but many have members in America. In the United States there are the Beresford Cat Club, founded in 1899, with headquarters in Chicago; the Atlantic Cat Club, with headquarters in New York; the Chicago Cat Club, the Louisville Cat Club, the Pacific Cat Club, the Orange and Cream Society, with headquarters in Chicago, the Washington, D. C., Cat Club, the Detroit Club, etc. All these have been founded since 1899; so we can see that the advances made of late years have been sudden and rapid; and they will continue to grow; for shows are held in many of the principal cities and are yearly fixtures. The Chicago shows have brought together the largest number of cats, 259, at the show held in the Coliseum in January 1902. Prices for cats increase; and whereas $25 was considered a good price five or six years ago, some of the best have been recently sold for $250 each, and many at $75 and $100. The largest price of which we have record as having actually been paid in cash for a cat is $300, which was the price Lady Decies paid Mrs. Greenwood for Lord Southampton; although I expect to see this exceeded in time to come, for competition enhances values, and the best specimens and most perfect will bring high prices from those who want them. All this will tend to draw attention to the cat and better the race and its general conditions.

Cats have had their artists: the Egyptians, the Japanese, the Chinese, Salvator Rosa, Gottfried Mind ("The Raphael of Cats"), Burbank (a master little known), Cornelius Wisscher, the Dutch artist, whose "Tom" cat has become typical, J. J. Grandville, Harrison Weir, Louis Wain, Madame Ronner, and Adam.

Members of the English royal family breed and exhibit cats at the regular exhibitions of the present day. Cats now have their regular stud-books, and their ancestry is carefully tabulated. The oldest registry in America is the Beresford Cat Club Stud-Book in Chicago. Another has been started in Washington, called the United States Official Registry, but it is a private enterprise and has no direct connection with any government department. The two great registers in Great Britain are the National and the Cat Club stud-books.

A Few Hints to Breeders.—Do not try to keep too many; a good cat well reared will bring more money than 8 or 10 badly nurtured, undersized kittens. Cats are not gregarious, and when crowded together become diseased and mangy, and prematurely die. One litter of really good cats will give more pleasure and profit to the owner than five or six litters of poor ones.

Liberty is necessary to the health alike of the present and of the coming generations, and these latter should never be out of our minds when mating.

Meat is the main diet of all the *carnivora* to which order domestic cats belong. The best diet for cats is composed largely of meat, for which their teeth are adapted. Without meat they will not long remain healthy. They vary in their tastes, and what is fancied by one is not always preferred by another. Fish they are fond of, but as a rule house-cats should not be given much raw fish. Cats kept in confinement should have grass, vegetables, and changes of diet provided for them. Grass is a necessity.

Epidemics that sweep through different countries and continents at stated periods decimate the cat family, and it is well to be prepared for such occasions by having none but the healthiest and best of animals. Distemper, the greatest of cat scourges, is best treated by nursing, care, and cleanliness. Fleas convey embryonic worms which infest cats, and should be rigorously kept down. They breed in cracks in the floor, in bedding, and in the ground, and war waged upon their haunts will be work well laid out.

Do not use nauseating drugs for ailing cats, but choose the mildest remedies that will effect a cure. Do not be prejudiced against a course of treatment till you have tried it well; and remember that supposed cures suddenly made are not always effectual. Cats, when ill, require sympathy as much as human beings, and more so than any other animal, in order to battle successfully with disease, for they have a tendency to be very pessimistic and sorry for themselves, and to recover or fail quickly. They suffer mostly from distemper, worms, eczema, bronchitis, pneumonia, and liver diseases, and occasionally from catarrhal fever. If you are acquainted with a good homœopathic physician, and have any idea of what ails your cat, consult him and abide by his advice.

Do not breed from your queens too young, although many good kittens have been raised from queens not a year old, if strong and healthy. Male cats will not mate as early in life as the queens, and are seldom of much use till a year old. Do not cross long-haired cats with short-haired cats, for you spoil the type of both. Siamese cats will breed with other cats, but the progeny are never good for the showroom; and the Siamese being a distinct breed, does not amalgamate with any of the other varieties. The Manx cat is better kept pure, or

the type degenerates and the result is not satisfactory.

Remember, when trying to rear good cats, that what goes in at the mouth and the care bestowed upon the young and growing animals cover 50 or even 75 per cent of essential requirements. The best blood in the world will not bring prize-winners or nice pets if they are badly reared. The crucial period takes in the first six months; when the young cat is well grown, and at seven months of age is through teething, you will have an animal that may live 20 years or more. Healthy cats are more long-lived than dogs, and authentic records tell of not a few over 20 years of age, and of some even 30.

Kittens should not be taken away from their mothers before they are at least eight weeks old; and if three months old, it will be still better. Care should be exercised in the diet of kittens at an early age. Sudden changes or sudden chills will bring on gastritis. Milk, unless pure, is more dangerous than meat, which in a raw state may be given scraped or minced at a very early age. Milk is better when mixed with Robinson's prepared barley according to the directions on the box, unless you can obtain warm milk from a cow that has not been too long in milk. The most dangerous diet for highly bred kittens is cold skimmed milk of an uncertain age.

Ladies who know how to bring up children properly can best rear kittens, and the care needed for the former is necessary to the latter. Science is a great help, but it will not offset the want of the most elementary principles of care and common sense.

Young cats are liable to fits, either when teething or from worms. Cats, when young, sometimes have fits. Quiet coaxing and attention will bring a cat through a fit, or a dose of belladonna will ward one off. Ordinary smelling-salts held to the nose of the cat may give relief, but as soon as possible the cause should be sought. Cats do not have follicular mange, but their troubles come from the blood. Ringworm is common in the cat tribe; it is communicable at a very rapid rate and must be vigorously combatted.

To destroy a cat, or put it out of its misery when too sick to recover, administer a few drops of chloral, place the cat, if possible, in a tight box, and when the cat is fast asleep drop into the box a sponge saturated with two or three ounces of chloroform. Do not put a cat in a box with the chloroform before administering the chloral, for its struggles will be terrific. By the proper method the cat will glide out of existence without causing any trouble.

Bibliography.— Woodruffe Hill, 'Diseases of the Cat'; Mrs. Cashel Hoey, 'The Cat, Past and Present'; Agnes Repplier, 'The Fireside Sphinx'; C. H. Ross, 'Book of Cats'; Frances Simpson, 'The Book of the Cat'; Harrison Weir, 'Our Cats'; H. M. Winslow, 'Concerning Cats'; and the following periodicals: 'Our Cats' (Manchester, Eng.); 'The Cat Journal' (Palmyra, N. Y.); 'Fur and Feather' (London); and the 'Ladies' Field.'

E. N. BARKER.

Cat-bird, one of two kinds of birds. (1) In North America a familiar songster (*Galeoscoptes carolinensis*) so called because of its mewing call-note, which is strikingly similar to the plaint of a kitten in distress. It is about nine inches long, and of a dark slate color, with a black cap, and a reddish patch under the tail. It is migratory only in the northern States, spends its winters in the South, and frequents bushy pastures and gardens. It has a brilliant and varied song, in which it seems to mimic the notes of other birds. Its four or five dark greenish-blue eggs are laid in bushes where it nests. In habit it is lively, familiar, and unsuspicious. It frequently attacks the common blacksnake, which, in the absence of the bird, rifles its nest. (2) In Australia, one of the bower-birds (*Ailurædus crassirostris*), so named named because of its cat-like call.

Cat-boat, a boat having one mast stepped just abaft the stem, and carrying a sail laced to a boom and gaff, resembling a schooner's mainsail. In general cat-boats are very broad in beam, averaging 1:3. They are usually equipped with a centre-board, which, with the extreme forward position of the mast, enables them to point high into the wind, and makes them remarkably quick in stays. They are principally employed as pleasure craft on the coasts and inland navigable waters of the United States, and are consequently of shallow draft.

Cat Island, one of the Bahama Islands, about 46 miles in length from north to south, and three to seven miles in its mean breadth. Pop. 3,000. This island was long identified with the Guanahani of Columbus, the first portion of land belonging to the New World on which he landed, 12 Oct. 1492. It is now thought by most that not this island but Watling Island, lying a little to the southeast, is the true Guanahani, and first landfall of Columbus.

Cat-owl, any of several widely distributed large owls, so called because of their feline habits and cat-like face. The best-known American cat-owl is the barred owl (*Syrnium nebulosum*), one of the largest birds of its kind, large specimens reaching 24 inches in length. It has no ear-tufts, and the general color is whitish, everywhere transversely barred with deep umber brown, except upon the abdomen, where the stripes run lengthwise. It is a lover of the woods, where its coughing cry resounds afar in the darkness, and where it breeds in hollows or among the branches of trees. It is not migratory, and often nests very early in the spring. This owl has the reputation of being especially destructive of poultry, but in truth it lives mainly on mice, of which it devours vast numbers each season, and hence is the benefactor rather than the marauder of the farm. Consult: Fisher, 'Hawks and Owls of the United States.'

Cat-shark, any of various members of the *Scylliorhinidæ*, a group of true sharks which are characterized by having two dorsal fins, the anterior of which is placed over or behind the ventrals, and by having the tail not bent upward. Some of these are called also "roussettes." The name cat-shark is also applied to the leopard-shark (*Triakis semifasciatus*).

Cat-snake, a small opisthoglyph (see OPISTHOGLYPHA) serpent (*Tarbophis vivax*) of Asia Minor and southeastern Europe. Its color is dull; it is sluggish in movement; and reaches

a length of three feet. It has long, recurved teeth in the lower jaw which serve to hold its prey (mainly lizards) until they are overcome by the snake's grooved poison-fangs. It is distinguished by being the only venomous snake of the opisthoglyph type in Europe.

Catabangenes. See CATUBANGANES.

Catacaos, kä-tä-kä'ōs, Peru, a city centrally situated in the maritime department of Piura, and on the Piura River. It is about 70 miles east of Piura, the capital of the department. Pop. 25,000.

Catachre'sis, a term used in rhetoric with a somewhat vague signification. It denotes any trope or figure of speech that is considered to be too violent. Thus any trope, whether a metaphor, an instance of metonymy, or any other, may become a catachresis if it is stretched too far. For example, the scriptural phrase "the blood of the grape" is often quoted as a case of catachresis, because it is thought too violent a metaphor to use "blood" for the blood-red juice of the grape.

Cat'aclysm, in geology, a physical catastrophe of great extent, supposed to have occurred at different periods, and to have been the efficient cause of various phenomena observed in the surface configuration of localities. The belief in cataclysmic movements as geological agents has largely given place to that in the working of ordinary agencies over long periods of time.

Cat'acombs, subterranean caves or vaults used as burial-places. All nations have been accustomed to some outward manifestation of regard for the dead, such as funeral solemnities, the consecration of grounds for sepulture, the erection of monuments, etc. Some nations, as the Egyptians, constructed pyramids and labyrinths to contain the remains of the departed. Others, as the Phœnicians and after them the Greeks, hollowed out the rocks for tombs, surrounding their towns with vast magazines, containing the bones of their fathers. Asia Minor, the coast of Africa, and Cyrenais, afford instances of these singular and gigantic works. The discovery of these monuments has always excited the curiosity of travelers and the attention of artists. The latter have applied themselves to learn from them the character of architecture and painting at different epochs; and though they have often found only coarse representations, the productions of art in its infancy or decline, they have occasionally met with types of perfection. Many monuments of this description have been preserved to our days, and still contain traces of the painting and architecture with which they were decorated. There are catacombs existing in Syria, Persia, and among the most ancient Oriental nations. But the revolutions in these countries, and the changes which they have occasioned, have deprived us of the documents which would have given us exact information regarding them.

The description of the catacombs in Upper Egypt gives us an idea of those whose existence is still unknown to us. They contain the history of the country, and the customs and manners of the people, painted or sculptured in many monuments of the most admirable preservation. The subterranean caves of these countries, like almost all of the kind, have their origin in quarries. From the depths of the mountains which contain them, stone was taken, which served for the building of the neighboring towns, and also of the great edifices and pyramids which ornament the land. They are dug in a mountain situated in the neighborhood of the Nile, and furnished the Romans with materials for the construction of buildings in their colonial establishments. The excavations in these mountains are found throughout a space of 15 to 20 leagues, and form subterraneous caverns which appear to be the work of art; but there is neither order nor symmetry in them. They contain vast and obscure apartments, low and irregular vaults, supported in different parts with piles left purposely by the workmen. Some holes, of about six feet in length and two feet wide, give rise to the conjecture that they were destined for sepulchres. Cells of very small dimensions, formed in the hollows of these obscure caverns, prove them to have been the abode of recluses.

In Sicily and Asia Minor a prodigious number of grottoes and excavations have been discovered containing sepulchres. Some appear to have served as retreats to the victims of despotism. The greater part are the work of the waters which traverse the mountains of these regions, as for instance the great cave of Noto, which passes for one of the wonders of Sicily. This cave, the height, length, and breadth of which are equal, has been formed by the Cassibili River, which runs at the bottom, and traverses it for the length of 100 fathoms. In the interior of this cave are a number of houses and tombs. At Gela, on the south coasts, there are abodes for the living and sepulchres for the dead, cut in the rocks; at Agrigentum subterraneous caves, labyrinths, and tombs, arranged with great order and symmetry. There are also caverns in the environs of Syracuse which may be ranked with the principal monuments of this description, from their extent and depth, their architectural ornaments, and from some historical recollections attached to them. The catacombs in the tufa mountains of Capo di Monte, near Naples, consist of subterraneous galleries, halls, rooms, basilicas, and rotundas, which extend to the distance of two Italian miles. Throughout there are seen niches for coffins (*loculi*) and bones. A description of them was given by Celano in 1643. They probably owe their origin to the quarries which afforded tufa for the walls of the cities Palæopolis and Neapolis, and afterward served as sepulchres for the Christian congregations.

The most numerous and extensive catacombs are those in the immediate neighborhood of Rome, at San Sebastiano, San Lorenzo, etc., the earliest of which of certain date belongs to the year 111 A.D. They are composed of interminable subterraneous galleries, extending underneath the town itself as well as the neighboring country, and are said to contain not less than 6,000,000 tombs. The name of catacombs, according to St. Gregory, was at first applied to designate exclusively the cave in which the bodies of St. Peter and St. Paul were buried, and it was only at a later period that it came to be given to all the subterraneous passages which were used as public burying-places. It is now regarded as certain that in times of persecution the early Christians frequently took refuge in the catacombs, in order to celebrate

there in secret the ceremonies of their religion; but it is not less certain that the catacombs served also as places of burial to the early Christians, and that in spite of the contrary opinion which prevailed for two centuries, and even down to our day, the catacombs were not for the most part abandoned quarries, but were excavated by the Christians themselves. It is found that originally the cemeteries of Rome were made up of separate tombs, which rich Christians constructed for themselves and their brethren, and which they held as private property under the protection of the law. But in course of time this was changed. At the end of the 2d century there existed certain cemeteries not the property of individuals but of the Church. Such was that which Pope Zephyrinus (202–19) intrusted to the superintendence of Calixtus, and which took its name from that bishop. Some years later, under Pope Fabian (236–51), there were already several such common burying-places belonging to the Christian congregations, and their number went on increasing till the time of Constantine, when the catacombs ceased to be used as burying-places. From the time of Constantine down to the 8th century they continued to be used as places of worship by the Christians, but during the siege of Rome by the Lombards they were in part destroyed, and soon became entirely inaccessible, so that they were forgotten. The first excavations in them were made by Antonio Bosio between 1560 and 1600. The results of these excavations were published in his 'Roma Sotterranea' (Rome, 1632), which was translated into Latin by P. Aringhi (Rome 1657). Among the more modern works on the subject may be mentioned: Rochette's 'Tableau des Catacombes de Rome' (Paris 1837); Perret's 'Les Catacombes de Rome' (Paris 1851–6); and 'La Roma Sotterranea Cristiana' by De Rossi (Rome 1864–77), containing the results of very careful investigations made by the author, who is justly regarded as the foremost student, in fact, father of this branch of archæology.

The catacombs of Paris, situated on the left bank of the Seine, are almost equally celebrated. The name itself, which has been given to this labyrinth of caverns and galleries from its resemblance to the asylums and places of refuge of the persecuted Christians under Naples and Rome, informs us of the purpose to which it has been applied since 1786. These galleries were originally the quarries from which materials were excavated for constructing the edifices of the capital. The weight of the superincumbent houses rendered it necessary to prop them; and when the cemeteries of the demolished churches and the burying-grounds were cleared in 1786, the government resolved to deposit the bones in these quarries, which were consecrated for that purpose. The first cemetery that was suppressed was the Cimetière des Innocents, and the bones from it were deposited beneath what is now Petit-Montrouge. The ossuary now extends much farther. The relics of 10 or more generations were here united in the repose of the grave. Many times as great as the living tide that rolls over this spot is its subterraneous population. By the light of wax tapers, a person may descend about 70 feet to a world of silence, over which the Parisian police keep watch as strictly as over the world of noise and confusion above. He will then enter a gallery where only two can go abreast. A black streak on the stones of the walls points out the way, which, from the great number of by-passages, it would be difficult for the visitor to retrace without this aid or without guides.

Among the curiosities here is a plan of the harbor of Mahon, which an ingenious soldier faithfully copied from memory, in the material of the quarries. Entering the hall, one is ushered into the realms of death by the inscription which once stood over the entrance to the churchyard of St. Sulpice: "*Has ultra metas requiescunt beatam spem exspectantes*" ("Beyond these bounds rest those awaiting the hope of bliss fulfilled"). Narrow passages between walls of skeletons; chambers in which monuments, altars, candelabra, constructed of human bones, with festoons of skulls and thigh-bones, interspersed occasionally with inscriptions, not always the most happily selected, from ancient and modern authors, excite the gloomy impression which is always produced, even in the most light-minded, by the sight of the dissolution of the human frame. Wearied of these horrible embellishments, the visitor enters a simple chapel, without bones, and containing an altar of granite. The inscription "D. M. II et III Septembr. MDCCXCII." recalls to memory the victims of the September massacres, whose remains are here united. On leaving these rooms, consecrated to death, where, however, the air is always preserved pure by means of air-holes, the visitor may pass to a geological cabinet, formed by Héricart de Thury, the director of the Carrières sous Paris. Specimens of the minerals furnished by the regions traversed, and a collection of diseased bones, in a contiguous hall, scientifically arranged, are the last curiosities which these excavations offer. More than 600 yards to the east of the road to Orleans the visitor finally returns to the light of day. Strangers may visit the catacombs in company with the government officials at the periodical visits. An account of these subterranean passages is that which was published by M. Dunkel in 1885.

The Etruscan tombs were not, strictly speaking, catacombs, yet as subterranean places of sepulture they may appropriately be referred to. They were usually hewn out of cliffs on the sides of a hill and were variously arranged, sometimes tier above tier and sometimes on a level. There was a central chamber with smaller ones opening from it. In the latter there were stone benches to receive the bodies of the dead.

Catacoustics, kăt-ą-koos'tĭks or -kows'tĭks, the science which treats of reflected sounds, or that part of acoustics which considers the properties of echoes.

Catafalque, kăt'ą fălk, an ornamental structure, in the form of a scaffolding or stage, for temporary use at ceremonious funerals. It is placed over the coffin containing a body lying in state, as in a church or other public edifice, and is sometimes used as a hearse, or set, as the representation of a tomb, over a grave.

Cat'alan, a native of Catalonia, or northeastern Spain, or the language of Catalonia, which holds a position similar to the provençal,

having been early cultivated, and boasting a considerable literature. It was established as a literary language by the close of the 13th century, and is still to some extent used as such in its own region.

Cat'alan, a blast furnace for reducing ores, extensively used in the north of Spain, particularly in the province of Catalonia. It consists of a four-sided cavity or hearth, which is always placed within a building and separated from the main wall thereof by a thinner interior wall, which in part constitutes one side of the furnace. The blast-pipe comes through the wall, and enters the fire through a twyer which slants downward. The bottom is formed of a refractory stone, which is renewable. The furnace has no chimneys. The blast is produced by means of a fall of water, usually from 22 to 27 feet high, through a rectangular tube, into a rectangular cistern below, to whose upper part the blast-pipe is connected, the water escaping through a pipe below. This apparatus is exterior to the building, and is said to afford a continuous blast of great regularity; the air, when it passes into the furnace, is, however, impregnated with moisture.

Catalan Grand Company, The, a name of a troop of adventurers raised by Roger di Flor about the beginning of the 14th century. Roger first gave his services to Frederick, king of Sicily, in his war with Robert, Duke of Calabria, but when peace was concluded between the two princes, being at a loss how to maintain his soldiers, he proposed to lead them to the East to contend against the Turks, who were then desolating the eastern empire. Andronicus, then emperor of the East, gladly accepted the offered assistance of Roger, and submitted to all the conditions which he imposed. Roger set sail from Messina, Sicily, in 1303, with 26 vessels partly equipped at his own expense. The number of the troops embarked with him is said to have amounted to about 8,000 men of different nations, Sicilians, Catalans, Aragonese, etc. The Catalans, either because they were the most numerous or for some other reason, gave their name to the whole company. On his arrival at Constantinople Roger was received with great rejoicings, and was elevated to the dignity of grand duke. A bloody affray between the Genoese and the Catalans marked the first period of the stay of these adventurers in Constantinople. Andronicus hastened to get them to cross over into Asia. This they did in the spring of 1304, and in the same year they defeated the Turks completely. In 1305 he took Ancyra, and forced the Turks to raise the siege of Philadelphia, but he was not so successful in his attempt to take Magnesia. After a long and ineffective siege he recrossed into Europe in 1306, bringing along with him his Catalans, who left behind them everywhere traces of their plunder and violence. When they had reached Europe they took up their quarters at Gallipoli. But Andronicus, who was by this time very anxious to be rid of his formidable allies, now received Roger with great coldness, and even obliged him to give up his title of grand duke in favor of Berengarius. The sudden departure of Berengarius, however, and the simultaneous incursions of the Turks into Asia Minor, compelled Andronicus again to appeal to Roger and his Catalans for assistance. Roger was raised to the dignity of Cæsar to appease him for the slights that had been put on him. But this only caused him to be regarded with more jealousy by the Greeks, and especially by Michael, the son of Andronicus, who was associated with his father in the empire. The result was that before he could start once more for Asia he was assassinated (1306 or 1307). The Catalans now turned their arms against the Byzantines, in order to avenge the death of their leader, and defeated them in several battles. They then passed into Greece and entered the service of the Duke of Athens, but no long time afterward they turned against him and defeated him in the battle of Cephissus (1311). They now became masters of Attica, where they maintained themselves for four years, when they were finally defeated by Philes near Bizyn (1315).

Catalanganes, kä-tä-län-gäns', a Malay people of Mongoloid type, living in the flood plain of the Catalangan River (province of Isabela, Luzon). They are heathen and peaceable, and speak the same language as the Irayas.

Catalani, Alfredo, äl-frā'dō kä-tä-lä'nē, Italian composer: b. Lucca 19 July 1854; d. Milan 7 Aug. 1893. He was graduated at the Paris Conservatory and settled in Milan, where he achieved fame with brilliant operas, especially 'Dejanice,' 'Loreley,' and 'La Wally.'

Catalani, Angel'ica, Italian singer: b Sinigaglia, most probably in 1782, although several other years are given; d. Paris 13 June 1849. As early as her 7th year her magnificent voice had become the subject of general remark, but it was not till the age of 14 that she received any instruction in the higher departments of the musical art. At 16 she was compelled by family misfortunes to turn her talents to account, and made her first appearance on the stage at Venice. She afterward filled the grand soprano parts at the operas of Milan, Florence, Rome, and Naples, and in 1799 accepted an engagement at the opera of Lisbon, where she continued for five years. She then visited successively Madrid, Paris, London, and the principal towns of Great Britain, in all of which her success and profits were immense. In 1814 she returned to Paris to take the management of the Italian opera there, but sustained thereby severe pecuniary losses from the injudicious interference of her husband, De Valabrégue, formerly a captain in the French army. On Napoleon's return in 1815 she was obliged to resign the direction of the opera, but resumed it again on the second restoration. In 1818 she again resigned the direction of the opera, and from that year till 1828 made repeated professional tours through the Continent and Great Britain. In 1830 she retired from public life to a villa in the neighborhood of Florence, and here she resided with her family and gave instruction to girls who manifested indications of local talent, one condition being required from them that they should adopt the name of Catalani. She was a woman of majestic appearance, and her voice displayed a wonderful degree of power, flexibility, and compass. She rather, however, astonished and overpowered an audience than touched or subdued their hearts by her marvelous execution.

Catalau'nian Plain, the wide plain around Châlons-sur-Marne, in France, famous as the field where Aëtius, the Roman general, and Theodoric, king of the West Goths, gained a complete victory over Attila and the Huns, 451 A.D.

Cataldo, kā-tăl'dō, **St.,** Italy, a town in the province of Caltanissetta, five miles west-southwest of the town of Caltanissetta. The sulphur works in the environs produce annually about 1,875 long tons. Pop. 12,800.

Cat'alepsy, a peculiar motor phenomenon, not a disease, that is found in a number of nervous disorders. It consists of a persistent muscular attitude of some part of the body, and may or may not be attended by unconsciousness. Thus a person may place the right arm or leg, or another may so place the limb, in a peculiar, or awkward, or in fact any position. This position is maintained by the patient for a very long time, usually a time much longer than a normal individual could maintain it. Almost any muscle group may be involved. The patients may squat on the floor, or stand on one leg for hours, or hold both arms in the air almost all day. There seems to be some form of muscle anæsthesia and the position of the limb seems to be unknown and unfelt by the patient. This symptom is very frequent in cases of true hysteria, and it is also found in a number of other affections that cluster about hysteria. Thus it is present in somnambulism, in hypnosis, in a peculiar mental state known as catatonia, and in stuporous melancholia,—all of which have much in common, being affections superimposed on the hysterical nervous organization, a type of make-up of a character, whose main features are assuming a definite recognition by students of the functions of the nervous system. See Janet, 'Mental State of Hystericals'; Raymond, 'Obsessions et Psychasthenies'; Starr, 'Text-Book of Nervous Diseases.' See HYSTERIA.

Cataloguing. See LIBRARY.

Catalo'nia, Spain, an old province (ancient TARRACONENSIS), bounded north by France, east by the Mediterranean, south by Valencia, and west by Aragon; area, 12,480 square miles. The country in general is mountainous, but intersected with fertile valleys, while the mountains themselves are covered with valuable woods and fruit-trees, as the slopes are plentifully supplied with water by an artificial system of irrigation. The main river of Catalonia is the Ebro; there are also the Segre, Ter, Llobregat, and many smaller rivers. Corn, wine, oil, flax, hemp, legumes, and almost every kind of fruit, are abundant. There are also quarries of marble of all colors, of crystal and alabaster; mines of lead, tin, iron, alum, vitriol, and salt, and formerly of gold and silver. On the coast is a coral-fishery. Catalonia is naturally much less fertile than either of the Castiles; but it surpasses every other province in Spain in the industry and intelligence of its inhabitants, and the improvements which have been effected in manufactures, agriculture, and commerce. It comprises the modern provinces of Tarragona, Gerona, Lerida, and Barcelona. The principal towns are Barcelona, Tortosa, Tarragona, Gerona, Manresa, and Lerida. Pop. 1,980,000.

Catal'pa, a genus of deciduous trees of the natural order *Bignoniaceæ*. There are about eight species, all natives of the northern hemisphere, four being hardy in cool temperate climates. They are all ornamental because of their large, bright-green leaves and conspicuous panicles of large, two-lipped, bell-shaped, white or yellowish flowers followed by long pods which persist until spring. Several of the species are highly esteemed for their timber, which is especially valued as fence-posts and railwayties because of their durability when in contact with the soil. For this reason they are frequently planted, especially *C. speciosa,* which is one of the hardiest. They are easily propagated by seeds sown in spring or by ripewood cuttings, and they succeed well upon moist loams from New England southward. A leaf-spot disease, *Phyllosticta catalpæ,* which sometimes attacks the foliage, may be controlled with anv standard fungicide (q.v.).

Catalyt'ic Action, Catalysis, or **Catalysm.** When chemical decomposition is brought about in any compound, and its ingredients are made to enter into new combinations in consequence of the introduction of another body, which does not itself form a part of any of these combinations, nor lose either of its constituents, but acts in some manner not understood, apparently by its mere presence or contact, to excite this chemical action, the force is called by Berzelius catalytic. A small quantity of yeast thus acts to cause a mixture of sugar and water to ferment, and form the new combinations of carbonic acid and alcohol; the addition of $\frac{1}{100}$ part of oxalic acid to boiling syrup of sugar, causes it to become fluid as water, and refuse to crystallize. Liebig objected to this introduction of a new theoretical force, which does not actually explain the phenomenon by giving it a name, but tends to satisfy the understanding with a plausible explanation, and thus hinder further research.

Catamaran, kăt'a-ma-răn, a sort of raft used in the East Indies, Brazil, and elsewhere. Those of the island of Ceylon, Madras, and other parts of the Indian coast, are formed of three logs. The timber preferred for their construction is the dup-wood or *cherne-maram,* the pine-varnish tree. Their length is from 20 to 25 feet, and breadth 2½ to 3½ feet. The logs of which they are constructed are secured together by means of three spreaders and cross lashings through small holes. The centre log is much the largest, and is pointed at the fore end. These floats are navigated with great skill by one or two men in a kneeling posture. They think nothing of passing through the surf which lashes the beach at Madras, and at other parts of these coasts, when even the boats of the country could not live upon the waves, and they are also propelled out to the shipping at anchor when boats of the best construction would be swamped. In the monsoons, when a sail can be got on them, a small outrigger is placed at the end of two poles as a balance, with a bamboo mast and yard, and a mat or cotton-cloth sail.

Catamarca, kä-tä-mär'cä, Argentine Republic, a province, bounded north by Salta, east by Tucuman and Santiago del Estero, south by Cordova and Rioja, and west by Rioja and Chile; area, about 47,530 square miles. The

surface is very mountainous in parts, except the southern, where it stretches out into a large plain. The loftiest and best known of the mountains is the Sierra de Aconquija, which stretches from south to north, and attains in its culminating point near its southern extremity a height of more than 16,000 feet. The Santa Maria, flowing north to the Huachipas, is the only river of any importance, but as every valley has its mountain stream, the whole province is well watered. The soil is fertile, producing large crops of maize and wheat, and supporting large numbers of live stock, especially goats. The vine is also cultivated, and yields wine and spirits which bear a high name in the surrounding countries. The principal exports are beasts of burden, horned cattle, and hides and goatskins, raw or tanned. The principal mineral is iron, but gold, silver, and lead are also found. The capital is Catamarca. Pop. 99,000, chiefly of Indian extraction, with a considerable mixture of Spaniards.

Catamarca, Argentine Republic, the capital of the province of Catamarca, situated in a valley 82 miles northeast of Rioja. It is connected by rail with Rioja and all the chief towns of the republic, and is the trade centre of a fertile district. It was founded about 1680, and has a fine church and a college. Pop. 7,500.

Catamount, a short form of the phrase "cat of the mountain," frequently found in the older books about America, and still occasionally used as a name for the lynx of the eastern United States, and sometimes for the puma, or "panther," once common in New England. The term is so indefinite that it is well that it has fallen into disuse.

Catanduanes, kä-tän-dwä'nēz, Philippines, an island lying northeast of the province of Albay, Luzon; its length is 44 miles north and south; width, 29 miles at the southern end; area, 704 square miles. The mountain system consists of three ranges that radiate from Mount Catilamong near the centre of the island; the rest of the surface is irregular, covered with low hills. The most important rivers are the Ocó and the Bató or Cabugao; there are also a number of smaller rivers, and the island is well watered. The soil is fertile, and rice, cotton, corn, and hemp are raised; indigo and cocoanuts are exported. The natives find gold, both dust and nuggets, in the gravel beds of many of the rivers. The largest town is Birac (pop. 5,832). The island does not form a province of itself, but is a constituent part of the province of Albay, and is included in the military department of Luzon. Pop. 33,300.

Cata'nia (ancient CATANA), Italy, a city of Sicily, in the province of Catania, on the borders of the valley of Noto, the see of a bishop, the suffragan of Monreal; 47 miles south-southwest of Messina, 85 east-southeast of Palermo. It is situated on a gulf of the Mediterranean, at the foot of Mount Ætna. This city has been repeatedly visited by violent earthquakes, and partially laid in ruins by lava from eruptions of Mount Ætna. The most disastrous eruption was that of 1669, by which many of the antiquities of Catania were overwhelmed, and the worst earthquake was that of 1693, when 18,000 people were destroyed. Although again greatly injured by the earthquake of 1783, Catania is now reviving with great splendor, and has much more the features of a metropolis than Palermo. The principal streets are wide and well paved with lava. Most of the edifices have an air of magnificence unknown in other parts of the island, and the town has a title to rank among the elegant cities of Europe. An obelisk of red granite, placed on the back of an antique elephant of touchstone, stands in the centre of the great square, which is formed by the town hall, seminary, and cathedral. The cathedral, a fine building, was founded in 1091 by Count Roger, but required to be mostly rebuilt after the earthquake of 1693. It is dedicated to St. Agatha, the patroness of the city. The suppressed Benedictine monastery of St. Nicholas, comprising a church (with splendid organ), library, museum, and other extensive buildings, was long celebrated for wealth and splendor. The university was founded about 1445. The ruins of the amphitheatre, which was more extensive than the Coliseum at Rome, are still to be seen, as also the remains of the theatre, baths, aqueducts, sepulchral chambers, hippodrome, and several temples. The industries include the manufacture of silk and cotton goods, and the mining of sulphur. The harbor was formerly a good one, but by the eruption of 1669 its entrance was almost entirely choked up, and it is only in recent times that it has been improved, a considerable amount of money having been spent on it. The trade of Catania is of some importance, the principal export being sulphur, next to which come oranges and lemons, almonds and other fruits, and wine. Cereals, textiles, and other manufactures are the chief imports. The exports have an average annual value of about $5,000,000. A circular railway runs from Catania round the base of Mount Ætna. Pop. 147,000.

Catanzaro, kä-tän-zä'rō (ancient CATACIUM), Italy, a city and capital of the southern province of the same name, on a height, eight miles from the Gulf of Squillace. It suffered severely from the great earthquake of 1783, but is still a place of some importance, defended by a citadel, and containing a cathedral and various other churches, an academy of sciences, one of the four great civil courts of the kingdom, a lyceum, and three hospitals. The manufactures consist chiefly of silk and velvet, and there is some trade in wheat, wine, oil, etc. Pop. about 30,000.

Cataphoresis, kăt-a fôr-ē-sĭs, a method of introducing remedies into the body by means of electricity. While certain substances can be made to penetrate the skin by means of electrical currents, the general cataphoretic method has not found favor with conservative and careful observers.

Cataphrac'ti, a group of fishes known also as "mailed-cheeked," characterized by having a bridge-like bone running from below the eye to the gill covers. The group includes the rockfishes, scorpion-fishes, sculpins, sea-poachers, lump-suckers, and sea-snails. Most of these live in the sea, but in North America there are several species of sculpins which dwell in freshwater streams and lakes, and are known as mullets. The names *Loricati* and *Parcioplitcæ* are also applied to this group. Consult: Jordan and Evermann, 'Fishes of North and Middle America.'

Cat'aplasm, or **Poultice,** some kind of soft compound intended to be applied hot to the surface of the body. Poultices are commonly made of linseed-meal, oatmeal, bran, bread crumbs, etc., mixed with water, milk, or some other liquid. They are called sinapisms, or mustard poultices, when mustard forms their base.

Cat'apult (Latin, *catapulta;* Greek *καταπέλτης*), a name for certain machines of the ancients for projecting missiles, chiefly arrows. *Ballistæ* (Greek, *πέτροβολοι* or *λίθοβολοι*), were engines somewhat similarly constructed, but were chiefly confined to the shooting of stones. *Tormentum* was a general name for all such machines. Catapults may be described as gigantic cross-bows, the most powerful of which consisted, not of a single beam or spring, but of two, inserted each into an upright coil of ropes, so twisted that the ends of the arms could not be drawn toward each other without producing a most violent recoil. These machines were described by the length of the arrow they were constructed to launch; thus there were three-span, two-ell, and other catapults. A three-ell catapult (*τριπήχυς*) weighed 588 pounds, the arrow fully 4 pounds, and five men were required to work it. The effective range was about 1,200 feet. The missiles used in *ballistæ* varied in weight from 15 to 90 pounds. The Romans did not carry all the parts of these machines with them, but only the ropes and fastenings, with the necessary tools; and the soldiers built the catapults when they wanted them. They were chiefly used in siege operations. The terms *catapulta* and *ballista* were often used indiscriminately; and in later times the word *catapulta* went entirely out of use. Vegetius and Ammianus Marcellinus never introduce it, and employ *ballistæ* to signify all machines throwing large arrows or beams, and *onager* for those throwing stones. The catapult used by schoolboys generally consists of a y-shaped stick, to the arms of which are attached strong elastic bands united in the middle by a piece of soft leather. A small stone or a few shot are placed in the leather, which is then pulled back and suddenly released, the elasticity of the bands projecting the missile to a considerable distance. It is often used against small birds. See ORDNANCE.

Cat'aract, in medicine, an opacity of the crystalline lens of the eye, or of its capsule, or both. It is quite different from amaurosis, which is a disease of the retina, by which it is rendered unsusceptible to the action of light. In cataract the lens becomes opaque, loses its transparency, and is no longer capable of transmitting the light. The causes of cataract are numerous. Inflammation or injury to the lens may produce it. Sometimes it is ascribed to a state of the vessels of the part which prevents a proper nourishment of the lens or its capsule. It is produced by various diseases, such as gout, rheumatism, diabetes, or scrofula, and often accompanies old age. Sometimes children are born with cataract. Its earliest approach is marked by a loss of the natural color of the pupil; this becoming turbid or slightly gray. *Muscæ volitantes* accompany this period. The opacity is not at first over the whole lens, but most frequently first attacks the centre portion; this being turbid and of a grayish color, while the surrounding portions remain transparent and of the usual black color. While it exists in this degree only, the person can see in an oblique direction. The color of the pupil is various; mostly grayish-white or pearl-colored; sometimes milk-white, or of a yellowish-gray; now and then of a grayish-brown, and even of a dark brown or dark gray. The consistence of the lens differs in different cases, being either hard and even horny, or very soft, as if dissolved.

The treatment of cataract is by a surgical operation on the eye, and different operations have been tried and recommended. They all consist in removing the diseased lens from its situation opposite the transparent cornea. By one of these operations the cataract is depressed, removed downward, and kept from rising by the vitreous humor. This is called couching. Another operation is extraction, and consists in making an incision of the cornea and of the capsule of the lens, by which the lens may be brought forward and through the cut in the cornea. The third operation is by absorption. This consists in wounding the capsule, breaking down the crystalline, and bringing the fragments into the anterior chamber of the eye, where they are exposed to the action of the aqueous humor, and are at length absorbed. This last operation has the name *keratonyxis* applied to it, and is chiefly employed in the case of children, because the lenses of their eyes are soft. The choice of the operation is determined by the character of the cataract. After the operation the patient is to be kept from the light, and from all means of irritation.

Cat'aracts (from Latin, *Cataracta,* a "waterfall"), one of the names given to sudden descents in streams of water, the more general English term being fall or falls. A considerable declivity in the bed of a river produces rapids. When it shoots over a precipice it forms a cataract. If it falls from steep to steep, in successive cataracts, it is often called a cascade. In rocky countries rivers abound in falls and rapids. In alluvial districts, falls, of course, are very rare. Rapids and cataracts are often a blessing to rugged countries, since they furnish the cheapest means of driving machines in manufactories, etc. In recent times waterfalls have been utilized in the furnishing of electric power in addition to ordinary water-power. Many cataracts are remarkable for their sublimity, the grandest known being Niagara Falls (q.v.), on the Niagara River, between lakes Erie and Ontario. Some others of note are mentioned below.

The Montmorency River, which joins the St. Lawrence a few miles below Quebec, forms a magnificent cataract, 250 feet high. The Missouri, in the upper part of its course, descends 357 feet in 16½ miles. There are four cataracts, one of 87, one of 19, one of 47, and one of 26 feet high. The Yosemite River in California forms a series of magnificent falls, with a total descent of 2,600 feet. The first of them is a plunge of 1,500 feet, and is followed, after a series of beautiful cascades, by a final plunge of about 400 feet. Fully 200 miles from the mouth of the Hamilton River in Labrador there is a magnificent series of cataracts known as the Grand Falls, the largest having a height of over 300 feet. In Colombia, South America, a great cataract, that of Tequendama, is formed by the Bogotá River. The river precipitates itself through a narrow chasm, about 36 feet broad, to the depth of over 600 feet. On the Potaro

River in British Guiana, the Kaieteur Fall, 740 feet high, and about 370 broad, is a splendid spectacle, and just below it is a second fall of 88 feet.

The most remarkable waterfall of Africa is one with which Dr. Livingstone's missionary travels first made us acquainted. This is a cataract on the Zambesi, called by the natives Mosioatunya ("smoke sounds here"), named by him Victoria Falls. The stream, about 1,860 yards broad, flowing over a bed of basaltic rock, is suddenly precipitated into a tremendous fissure, extending across the bed of the river from the right to the left bank, to the depth of about 370 feet. The breadth of this fissure or crack is only from 80 to 90 yards, and the pent-up waters, from which immense columns of vapor are continually ascending, are then hurried through a prolongation of the chasm to the left with furious violence. The so-called Cataracts of the Nile are not, properly speaking, cataracts. A more correct designation for them would be "rapids." The Stanley Falls on the Congo comprise seven cataracts. On the Tugela River in Natal there are the Tugela Falls. On the Umgeni River, in the same country, are the falls of the Great Umgeni (364 feet) and the Kar Kloof Falls (350). There seem to be no waterfalls of more note in Asia than those of the Cavery River of India.

One of the grandest falls in Europe is that of the Ruikanfoss ("smoking fall"), on the Maan River in Norway. The height of the cataract is 805 feet. In Sweden, on the Gotha River, a few miles below its outlet from Lake Wener, are the celebrated falls of Trollhätta, which have a height of over 100 feet. The cascade of Gavarnie, in the Pyrenees, is reputed the loftiest in Europe, being over 1,300 feet high. Its volume of water, however, is so small that it is converted into spray before reaching the bottom of the fall. Another waterfall in the Pyrenees is that of Seculéjo, in the neighborhood of Bagnères-de-Luchon. It ascends from the Lac d'Espingo, into the Lac de Seculéjo, or d'Oo, a singularly romantic mountain reservoir, from a height of 820 feet, and is the most copious of the Pyrenean waterfalls. The Swiss Alps likewise contain some falls of great sublimity. At Lauterbrunnen, in addition to numerous other cascades, is the renowned fall of the Staubbach, about 870 feet high, which, however, from its small volume of water, has none of the terrific adjuncts of a cataract, and resembles, in front, a beautiful lace veil suspended from the summit of the precipice. Near Martigny is the picturesque waterfall of the Sellesche or Pissevache, the final leap of the cascade being 128 feet. The falls of the Rhine at Schaffhausen are renowned over Europe. They are 300 feet broad, and nearly 100 feet high. In Italy the falls of Terni, or the Cascate del Marmore on the Velino, have been immortalized by Lord Byron, and though artificial, are justly regarded as among the finest and most picturesque in Europe. They consist of three falls, the aggregate height of which may be estimated at 550 feet. The falls of the Anio or Teverone, at Tivoli, are likewise very beautiful. They, too, are artificial, and have a fall of about 80 feet.

Catarman, kä-tär-män', Philippines, a town on the north coast of the Island of Samar, situated on the Catarman River, 55 miles northeast of Catbalogan. It has a good anchorage ground. In 1871 the town was destroyed by a volcano which burst forth in July from low land on the west side of island, and in two months had thrown up a hill two thirds of a mile long, one third of a mile wide, and about 450 feet high, destroying all vegetation for miles around. At the time of the visit of the Challenger, January 1875, the volcano had attained height of 1,950 feet, and was still active, there being visible columns of smoke by day and series of small fires at its summit by night. Pop. 10,482.

Catarrh, ka-tär', a flow from a mucous membrane. It is a symptom purely, and not a disease, and any mucous membrane of the body may be affected by an acute or chronic inflammation, usually entitled an acute or chronic catarrh; as, catarrh of the nasal mucous membrane, of the pharynx, larynx, stomach, intestines, rectum, bladder, vagina, etc. The word has general significance only, but it is much used by vendors of nostrums. See NOSE AND THROAT.

Cataw'ba, Wateree', or **Santee',** a river rising in the Blue Mountains, N. C., near Morgantown. It runs east and then south into South Carolina, where it is known for some distance as the Wateree, but after the confluence of the Broad River, it takes the name of Santee, then runs east by south, and after a course of 270 miles falls by two mouths into the sea between Charleston and Georgetown. This river gives its name to a wine, the grape from which it is made having been first discovered near its sources.

Cataw'ba, a light sparkling wine, of rich Muscatine flavor, produced in several parts of the United States. It is made from the Catawba grape, first found growing on the banks of the Catawba River in the Carolinas. This wine is now in extensive use, and is gradually superseding Rhenish and French sparkling wines, to which, in general character, it bears a resemblance. See WINES.

Catbalogan, kat-bä-lō-gän, Philippines, capital of the province of Sámar, situated on a small bay at the mouth of the Antigas River on the west coast. It is protected by a number of islands, Daram being the largest. The anchorage ground is not safe during the monsoon weather; Parasan Island Bay, 10 miles west, is then the refuge for vessels. The town has a large trade in hemp and cocoanut-oil with Manila, and steamers from Manila call every two weeks. Pop. 6,459.

Catch, a short piece of music written generally in three or four parts. It is a sort of short canon, the second voice taking up the theme when the first has completed the first phrase, the third following the second in same manner. These compositions are most frequently of a humorous and bacchanalian character, and have been from Purcell's time very popular in England.

Catch'fly, any one of several plants of various genera. The name is perhaps most commonly applied to species of *Silene* of the natural order *Caryophyllaceæ*, since their calyces and stems exude a clammy, sticky substance which attracts flies and holds and kills those that alight. Certain species of *Lychnis*, especially *L. viscaria*, a closely related genus, are also popularly called by this name. Sometimes,

too, the Venus flytrap is called Carolina catch-fly. See CARNIVOROUS PLANTS; LYCHNIS; SILENE.

Cateau, kă-tō, **Le,** or **Cateau-Cambrésis,** kăn-brä-zē, France, a town in the department of Nord, on the right bank of the Selle, 15 miles east-southeast of Cambrai. It was once fortified, though now open, and is famous for the treaty of its name signed here in 1559, by which Henri II. of France gave up Calais to the English; and agreed to abandon all he had conquered from Spain on condition that that country would do the like with her French conquests. Altogether France lost 189 fortified towns by the treaty. Le Cateau has manufactures of cotton, wool, merinos, cambric shawls, and a considerable trade in them, and in wine, iron, coal, and agricultural products in general. Pop. 10,500.

Catechesis, kăt-ē-kē'sĭs, the science which teaches the proper method of instructing beginners in the principles of the Christian religion by question and answer, which is called the catechetical method. Hence catechist and catechize. The art of the catechist consists in being able to elicit and develop the ideas of the youthful mind. This part of religious science was first cultivated in modern times, and Rosenmüller, Daub, Winter, Heinrich, Müller, Schwarz, Palmer, and others, have particularly distinguished themselves by their writings upon it.

Catechetical (kăt-ē-kĕt'ĭ-kăl) **Schools,** institutions for the elementary education of Christian teachers, of which there were many in the Eastern Church from the 2d to the 5th century. They were different from catechumenical schools, which were attached to almost every church, and which were intended only for the popular instruction of proselytes and children; whereas the catechetical schools were intended to communicate a scientific knowledge of Christianity. The first and most renowned was established about the middle of the 2d century, for the Egyptian Church at Alexandria, on the model of the famous schools of Grecian learning in that place. (See ALEXANDRIAN AGE.) Teachers like Pantænus, Clement, and Origen gave them splendor and secured their permanence. They combined instruction in rhetoric, oratory, and music, in classical Grecian literature, and the Eclectic philosophy, with the principal branches of theological study, exegesis, the doctrines of religion, and the traditions of the Church; distinguished the popular religious belief from the *Gnosis,* or the thorough knowledge of religion; established Christian theology as a science, and finally attacked the dreams of the Chiliasts (believers in a millennium); but by blending Greek speculations and Gnostic phantasies with the doctrines of the Church, and by an allegorical interpretation of the Bible, contributed to the introduction of heresies. The distraction of the Alexandrian Church by the Arian controversies proved the destruction of the catechetical schools in that place about the middle of the 4th century. The catechetical school at Antioch appears not to have been a permanent institution like the Alexandrian, but only to have been formed around distinguished teachers, when there happened to be any in the place. There were some distinguished teachers in Antioch about the year 220. We have no certain information, however, of the theological teachers in that place, such as Lucian, Diodorus of Tarsus, and Theodore of Mopsuestia, until the latter part of the 4th century. These teachers were distinguished from the Alexandrian by more sober views of Christianity, by confining themselves to the literal interpretation of the Bible, by a cautious use of the types of the Old Testament, and by a bolder discussion of doctrines. The Nestorian and Eutychian controversies, in the 5th century, drew after them the ruin of the schools at Antioch. Of a similar character were the schools instituted at Edessa in the 3d century, and destroyed in 489, and the school afterward established at Nisibis, by the Nestorians, in its stead; both of which were in Mesopotamia. To these schools succeeded, at a later date, the cathedral and monastic schools, especially among the western Christians, who, as late as the 6th century, made use of the heathen schools, and had never established catechetical schools even at Rome.

Cat'echism, a form of instruction by question and answer, especially instruction in Christian doctrine by that method; and not the instruction only, but the book in which the questions and answers are contained. The Catechetical school of Alexandria was an institution designed to instruct pagans in the doctrines of the Christian Church (2d century). Its founder, Pantenos, was a Greek convert deeply learned in the Grecian philosophy and in the Hebrew Scriptures. Among his disciples was Titus Flavius Clemens, who became his successor as head of the school; and to Clemens (Clement of Alexandria) succeeded the illustrious Origen, who, at the early age of 18, was deemed worthy to be named to so responsible a post.

The catechetical instruction given by these masters of the Alexandrine school was conveyed rather in the form of lectures than in that of question and answer. The more familiar instruction given to catechumens in the early Church was of the same nature, but more simple and elementary. In the latter half of the 4th century St. Cyril, bishop of Jerusalem, composed 23 lectures, or in Greek *katacheseis,* of which 18 were addressed to postulants for baptism (catechumens) and five to the neophytes after their baptism. These latter he called mystagogic catacheses, or instruction in the mysteries of Christianity. They are of a more popular character than the catacheses of the Alexandrines, and are believed to be the first example of a popular compendium of the Christian doctrines.

In the Roman Catholic Church the Catechism of the Council of Trent, or Roman Catechism or *Catechismus ad Parochos* (Catechism for Parish Priests) is addressed especially to pastors and others having cure of souls, suggesting to them the manner of expounding Christian doctrine and of enforcing the precepts of Christian morality in their sermons from the pulpit and in conveying religious instruction to the young. It is also designed as a basis and model in composing short expositions of Christian doctrine for popular use among the laity. The Catechism of the Council of Trent was first published in 1566 in Latin, and formed a considerable volume, 500 pages 8vo. A decree of the Council of Trent ordered all bishops to "take care to have the Catechism faithfully translated into the vernacular language and expounded to the people by all pastors." Translations were accordingly

made into Italian, French, Spanish, and German. The first English translation was not published till 1829. It is a large octavo, closely printed, of over 400 pages. The work possesses high authority, but not the highest; it does not rank with the creeds of the Church or with the canons and decrees of councils or the dogmatic definitions of Popes.

All the principal divisions of Protestantism — the Anglican Church and its offshoots, the Lutheran and Calvinistic churches, the Presbyterians, Methodists, and Baptists — have catechisms. Many of these Protestant catechisms, as the Catechism of Luther, the Calvinist of Geneva, the Westminster Larger and Shorter catechisms, the Catechism of the Church of England, possess in their several churches an authority equal or comparable to that of their several creeds or confessions of faith.

Catechist. See CATECHISM.

Cat'echu, an earthy or resin-like substance, used in dyeing and calico-printing, and in medicine as an astringent. It is obtained by boiling the leaves, wood, and fruit of certain plants growing in India and other eastern countries (notably the *Acacia catechu*), and concentrating the extract by evaporation until it will solidify. Catechu (known also in the trade as "cutch") consists mainly of catechu-tannic acid, which is soluble in cold water, and catechin, which is insoluble in cold water, but soluble in hot water. In medicine catechu is of service because of the tannin that it contains. It acts as an astringent and is serviceable in diarrhœa and dysentery. Catechu is also used in lozenges for affections of the mouth and throat.

Catechumen, a person who is under instruction and probation preparatory to admission to membership in the Christian Church through baptism. On the day of Pentecost and in the early days of the Church's mission the converts to the religion of Jesus Christ were admitted through baptism to fellowship in thousands at a time, without any preliminary inquiry into their dispositions, and without any instruction in the articles of Christian belief or the new obligations contracted by admission into the Christian body. But when the first enthusiasm of conversion had cooled doubtless many were found who "walked no more" in the way of the apostles and went back to their pagan or their Jewish beliefs and practices, or worse, who after two changes of religion lapsed into open contempt of all religion and of all morality. To guard against the scandal of such apostasies the Church provided a system of preliminary graduated instruction and probation for those who desired admission to the Christian communion. The candidates for admission to the Church, to the body of the faithful (believers, *fideles, pistoi*) were called catechumeni (persons under instruction) and even in this class there were three or even four separate grades. There was the first grade, that of those who, having expressed a desire for admission were put under instruction privately by some officer of the Church: this class was not admitted at all to the assemblies of the faithful. Those in the second grade, that of the *acroomenoi, audientes,* hearers, were admitted to the assembly for worship, but were required to withdraw after the reading of the stated passages from the evangelic and apostolic books and the sermon or exhortation by the bishop. Those of the third grade, the *gonyclinontes, genuflectenter,* those "bending the knee," that is, who join in the prayers of the faithful, remained in the congregation till certain prayers in the liturgy were said and the bishop had pronounced his benediction. The fourth grade included all those who, having passed the first three were to receive the rite of baptism and thereby were to be admitted to full communion with the faithful on the next stated day for administration of that sacrament: these are the *photizomenoi,* instructed, or *competentes,* or *electi.* The first two grades are not recognized as two by all Church historians.

Such a term of preliminary instruction and probation was imperatively necessary in the ages of persecution, to save the Christian body from the scandal of apostasy on the part of converts who entered the Church either from unworthy motives, as, for example to act as informers; or who entered without weighing the obligation they assumed to lead a holy life void of all offense, and who disgraced their Christian profession by their disorderly lives. The institution of the catechumenate persisted after the peace of the Church was proclaimed by the first Christian emperor, and indeed the need of it was greater now that the profession of the Christian religion seemed the gateway to honor and power in the state instead of to martyrdom. The press of candidates for admission to the Church was great; and even the children of believers like converts from the pagan religion had to pass through the catechumenal grades. Out of this grew a great abuse and a great scandal. Men who sought admission to the Church for other reasons than a desire to lead a Christian life, would enter themselves as catechumens, postulants, and would continue in that grade for an indefinite period, not pledging themselves to observance of the law of Christ and the Church till the end of their life was at hand. Nor was it the converts from paganism alone that thus deferred baptism, as Constantine did, but the children of Christian parents often followed their example. Yet the motive for deferring baptism was not always a desire to evade the obligations of the Christian profession; in very many instances the delay was prompted by a conscientious scruple lest the baptized person falling from grace afterward should commit a sin that could never be condoned: among illustrious men who for a time acted on this scruple are numbered even doctors of the Church — Saints Ambrose, Gregory of Nazianzum, Augustin.

The ancient church edifices provided for the separation of the catechumens from the faithful that were in full communion. In the ancient church of Saint Clement in Rome, the body of the building is divided off by stone constructions into the *presbyterium,* chancel or sanctuary for the clergy at the eastern end, a middle compartment for the faithful in full communion — the galleries here being reserved for the women — and in the western end, or front, a much larger compartment of the nave for the catechumens.

Category, in logic and philosophy, an assemblage of all the beings contained under any genus or kind ranged in order. Metaphysicians distribute all beings, all the objects of our thoughts or ideas, into certain genera or classes, which classes the Greeks call categories, and the Latins predicaments. The ancients, follow-

ing Aristotle, generally make 10 categories. Under the first all substances are comprised, and all accidents or attributes under the last nine, namely, quantity, quality, relation, action, passion, time, place, situation, and habit. This arrangement, however, is now almost excluded. Descartes thought that all nature may be better considered under these seven divisions: spirit, matter, quantity, substance, figure, motion, and rest. Others make but two categories, substance and attribute, or subject and accident; or three, accident being divided into the inherent and circumstantial. The arrangement of the 10 categories was borrowed from the Pythagorean school. It is said to have been invented by Archytas of Tarentum. From him it passed to Plato (who, however, admitted only five categories — substance, identity, diversity, motion, and rest) and from Plato to Aristotle. The Stoics held four — subjects, qualities, independent circumstances, relative circumstances. The term categories is applied by J. S. Mill to the most general heads under which everything that may be asserted of any subject may be arranged. Of these, five are recognized by Mill; namely, existence, coexistence, sequence or succession, causation, and resemblance. This arrangement affords a general classification of all possible propositions, which must thus either affirm or deny the existence of one or more things or attributes, the coexistence, sequence, or resemblance of two or more things or attributes, or must affirm or deny that one thing is the cause of another. Causation, however, is regarded by him only as a peculiar case of succession, so that the five categories of Mill may be considered to be reduced to four, causation being omitted. For the categories of Kant, see KANT.

Catel, kä tĕl, Franz, German artist: b. Berlin 22 Feb. 1778; d. Rome 19 Dec. 1856. His earliest efforts were designs for illustrated almanacs. He then painted in oil and water colors, and took up his abode in Rome in 1812. Overbeck, Schadow, and Cornelius gave him much encouragement, and he painted historical and genre pieces, and landscapes, in which last-named department of his art he was especially successful. During a residence in Sicily, about the year 1818, he painted a large number of views of Mount Ætna, and other prominent places on the island. He died rich, directing his fortune to be invested for the benefit of poor artists.

Cat'enary, the curve assumed by a perfectly flexible cord supported at both ends and allowed to sag between supports. The cables of a suspension bridge hang in catenaries before any of the other parts of the bridge are attached. The effect of the weight of the road-way, etc., is to draw the cables into curves more nearly approaching the parabola.

Cat'erpillar, the larva of a moth or butterfly. The body is long and cylindrical, consisting, besides the head, of 3 thoracic and 10 abdominal segments, the last one forming the suranal plate. The three pairs of thoracic legs are solid, horny, and jointed, while the supports of the abdominal segments, of which there are five pairs, are soft and fleshy. Caterpillars are very voracious, the digestive canal being very large. The American silk-worm (*Telea polyphemus*), at the end of its life as a caterpillar, has eaten not less than 120 oak leaves weighing three fourths of a pound; its food, taken in 56 days, equals in weight 86,000 times the primitive weight of the worm. The jaws of caterpillars are large, black, horny appendages, and are toothed on the cutting edge so as to pass through a leaf somewhat like a circular saw. The eyes are minute, simple eyelets, three or four on each side of the head, and only useful, probably, in distinguishing day from night. The silk is spun through the tongue-like projection (spinneret) of the under lip. It is secreted in two long sacs within the body. The thread is drawn out by the two fore feet, which are three-jointed and end in a single claw. The legs on the hind body, sometimes called prop-legs, are fleshy, not jointed, and end in a crown of hooks which curve outward, enabling the caterpillar to firmly grasp the edge of the leaf or a twig of its food-plant. Most caterpillars are more or less hairy or spiny, rendering them, when especially so, disagreeable to birds; besides this, they are bright colored, so that birds readily recognize them and waste no time over them, but search for the common green smooth-bodied ones, which are, however, so difficult of detection by the birds that plenty are left to become moths or butterflies. Certain caterpillars, as the currant-worm, though smooth-bodied, are brightly spotted; these, however, have a disagreeable taste. The bright colors are thus danger signals, hung out to warn the birds and other enemies.

Catesby, Mark, English naturalist: b. probably in London about 1679; d. London 23 Dec. 1749. He traveled in North America in 1710–19 and 1722–6, and published 'Natural History of Carolina, Florida, and the Bahama Islands' (2 vols. 1731–43), 'British-American Flowers,' and a work on the fishes, reptiles, and insects of the isle of Providence. German translations of the first and last appeared at Nuremberg.

Catfish, any of the fishes of the order *Nematognathi,* more especially of the family *Siluridæ.* This large family is characterized by having the body naked or covered with bony plates, but without true scales. About the mouth there are two or more barbels, the longest of which are at the corners of the mouth. There is usually a stout, generally serrated, spine in front of the dorsal fin, and another in front of each pectoral fin. These spines are likely to inflict considerable injury on the careless fisherman. There is a poison-gland connected with the pectoral spine of some of the smaller species, and wounds are very painful. This is one of the most widely distributed families of fishes, and is especially abundant in South America and Africa. Most of them live in fresh waters. There are estimated to be about 1,000 species.

The catfish are sluggish in their movements, securing their prey rather by stratagem than by swiftness. They are bottom-feeders and indiscriminate, so that although, on account of their size and abundance, they constitute an important element in the fish food of the countries they inhabit, their flesh is not considered of high quality in taste. North and middle America contain 100 or more species, of which a third, perhaps, are to be found in the United States and Mexico. The majority are not of much importance, but some are of great local value. At the head of the commercial list stands the

channel cats of the genus *Ictalurus,* which are found throughout the Mississippi valley and gulf States, and are caught in vast quantities not only for home use, but for export, as much as 2,000,000 pounds annually being dressed, packed in ice, and shipped from Morgan City, La., the central mart of the Atchafalaya River fisheries, which are in operation from September to May. The method of capture is by "trot-lines" from a few yards to a mile long. The catfish move with the season's temperature of the water, going down stream in winter and up in summer. At the season of the spring floods they are carried over the swamps and adjacent lands, and thousands are caught by the shorter "brush" lines. There is a regular collecting service of tugs. The Louisiana species most taken is the chucklehead (*I. furcatus*), which loves sluggish waters. A more northerly species, ordinarily 20 to 25 pounds in weight, is the "blue" or "white" channel cat (*I. punctatus*), which thrives in the colder, swifter waters of the Tennessee, Cumberland, and neighboring rivers, whose flesh is declared equal to that of the black bass. Both these have been acclimated in California. The largest of the American species is the great fork-tailed Mississippi cat (*Amiurus lacustris*), which inhabits all the lakes and big rivers from the Saskatchewan and Great Lakes to Florida and Texas, and reaches a weight of 150 pounds or more. The so-called Potomac River cat (*A. catus*) is the one most familiar in the east, since it abounds from the Delaware River to Texas, but is most common in the waters of Chesapeake Bay and southward to Florida. It is next in commercial value to the Great Lakes fish. It has a very wide head and large mouth, but seldom exceeds two feet in length. The smaller yellow cat (*A. natalis*) and other species of this genus are numerous in the interior, but not of great importance. (See BULLHEAD.) The mud cat or goujon (*Leptope olivaris*) is a slender pike-like fish with a very large, wide head and mouth, and a thick skin, which lives in the sluggish rivers of the southern States. It is sometimes five feet long and 100 pounds in weight, but is most repulsive in appearance; its flesh, however, is excellent, and is often sold, dressed, for that of the favorite western channel cat. Other genera and species go by such names as mud-cats, stone-cats, mad toms, etc., and will be found elsewhere described, as well as many foreign species of interest and value.

Consult, besides general works, Jordan and Evermann, 'Food and Game Fishes of America,' and the publications of the United States Fish Commission.

Cat'gut is made from the intestines of different quadrupeds, particularly those of sheep. The manufacture is chiefly carried on in Italy and France. The texture from which it is made is that which anatomists call the muscular coat, which is carefully separated from the peritoneal and mucous membranes. After a tedious process of steeping, scouring, fermenting, inflating, etc., the material is twisted, rubbed with horse-hair cords, fumigated with burning sulphur to improve its color, and dried. Cords of different size, and strength, and delicacy, are obtained from different domestic animals. The intestine is sometimes cut into uniform strips with an instrument made for the purpose. To prevent offensive effluvia during the process, and to get rid of the oily matter, the French make use of an alkaline liquid called *eau de javelle.* Catgut for stringed instruments, as violins and harps, is made principally in Rome and Naples. For the smallest violin strings three thicknesses are used; for the largest seven; and for the largest base-viol strings 120. It is well known that the membranes of lean animals are tougher than those in a high-fed condition, and there can be no doubt that from the lean and small-sized Italian sheep strings superior to all others are produced. In Naples, whence the best treble strings, commonly called "Roman," are obtained, there are large manufactories of this article.

Cath'a, a genus of plants belonging to the order *Celastraceæ,* or staff-tree family. The species are mostly natives of Africa, forming small shrubs, sometimes with spiny branches. *Catha edulis* is a native of Arabia, and from the leaves the Arabs make a beverage possessing properties analogous to those of tea or coffee. Under the name of *kât* or *cafta,* the leaves form a considerable article of commerce among the natives. Chewed, they produce wakefulness and hilarity of spirits.

Cathari, the name given to themselves by the adherents of numerous heretical sects, undoubtedly of Gnostic and Manichean origin, which swarmed in western Europe, and particularly in northern Italy and southern France in the 12th century. At that period society had much advanced in wealth and power, which brought their concomitant vices. There were many abuses prevalent in the Church, and some of the clergy led scandalous lives. The numerous heretical sects won adherents by violently and indiscriminately denouncing the entire hierarchy, from the Pope down to the monastic orders; but their tirades were not more emphatic than the philippics launched against the same scandals by sincere Catholics, their contemporaries, such as St. Bernard, St. Hildegarde, St. Malachi, archbishop of Armagh, and others. But while these sought to procure the eradication of the current abuses by a reformation from within the Church, the Cathari (Gr. *katharos,* Lat. *mundus, purus,* and *puritanus,* pure, clean) aimed at nothing short of the total destruction of the dominant religion, of its whole system of belief and even of its moral teaching. For not only were the sects styled Cathari (including a host of offshoots of eastern manicheism), heretics and reformers, but in their inner circles, dualists, believers in the existence of two supreme principles, the one a good principle, God, and the other an evil principle, the creator of the material world. But open profession was not made of this tenet: it was communicated only to the inner circle in the several manichean sects, to the elect ones, the *perfecti,* but withheld from the mass of their followers, the *credentes,* the faithful vulgar. To these latter and to outsiders the adepts of the *arcana* of catharism made profession of being strictly reformers of a corrupt ecclesiastical system, and of profound regard for the letter and spirit of the moral law as taught in the apostolic writings. As already said, they enthroned the evil principle as creator of the physical universe; they believed in the divine mission of Jesus Christ, the Son of God, that is, of the good principle; but with the Docetæ they denied that the Son of God had assumed human nature really, and held that his

humanity was phantasmal only. In conformity with their tenet of a supreme principle of good and a supreme principle of evil, the initiates condemned as works of the flesh, the sacraments of the Church as a whole, and looked on the contract of marriage as sinful. They held absolute predestination: that all men belong to one or other of two classes, those who will infallibly be saved, and those who cannot possibly attain holiness: hence their doctrine that an infant dying immediately after birth, if it belongs to the class of those predestined to be lost, is punished as is Judas in hell. They dared not confess that on their principles the elect cannot lose the divine favor by sin; but they did teach that repentance is of no account, and that the sins of the people are forgiven by the rite (*consolamentum*) of laying on hands. This honor was only a concession to the prejudices of the ignorant vulgar: the *perfecti*, the initiates of the *arcana* of catharism held themselves to be superior to the moral law.

Cath'arine, the name of several Christian saints: 1. St. Catharine of Alexandria, a virgin of royal descent in Alexandria, who publicly confessed the Gospel at a sacrificial feast appointed by the Emperor Maximinus, and was therefore put to death, after they had vainly attempted to torture her on toothed wheels, 307 A.D. Hence the name of Catharine wheel (q.v.). No less than 50 heathen philosophers sent by the emperor to convert her in prison were themselves converted by her winning eloquence; whence she is the patroness of philosophers and learned schools. Having steadily rejected all offers of earthly marriage, she was taken in vision to heaven, where Christ plighted his troth to her with a ring. This subject has been a favorite one with many artists (as signifying the union of the redeemed soul with Christ); the Christ being usually represented as an infant. It has been suggested that the attributes of the unhistorical St. Catharine seem to have been derived from those of the actual Hypatia, a heathen who suffered death at the hands of Christian fanatics. St. Catharine's festival falls on 25 November. 2. St. Catharine of Sienna, one of the most famous saints of Italy, was the daughter of a dyer in Sienna, and was born there in 1347. While yet a child she practised extraordinary mortifications and devoted herself to perpetual virginity. She became a Dominican, and therefore afterward a patron saint of the Dominicans. Her enthusiasm converted the most hardened sinners, and she was able to prevail upon Pope Gregory XI. for the sake of the Church to return from Avignon to Rome. She was given, it was said, extraordinary tokens of favor by Christ, whose stigmata were imprinted upon her body. She wrote devotional pieces, letters, and poems, an edition of which is Tomasseo's (Florence 1860). Her festival falls on April 30. 3. St. Catharine of Bologna (1413–63), festival March 9, and St. Catharine of Sweden (d. 1381; festival March 22), are of less note.

Catharine, St., Order of, the name of two organizations of very different character: (1) The Knights of St. Catharine on Mount Sinai, an ancient military order, instituted for the protection of the pilgrims who came to visit the tomb of St. Catharine on this mountain. (2) An organization in Russia, constituting a distinction for ladies, and instituted by Catharine, wife of Peter the Great, in memory of his signal escape from the Turks in 1711.

Catharine I., Empress of Russia: b. Ringen, near Dorpat, Livonia, 15 April 1684; d. St. Petersburg 17 May 1727. The early history of this remarkable woman is uncertain. According to some accounts she was the daughter of a Swedish officer named Rabe, who died shortly after she was born; according to others her father was a Roman Catholic peasant. She at first bore the name of Martha and entered the service of a clergyman named Glück, at Marienburg, who caused her to be instructed in the Lutheran religion. Here she was married to a Swedish dragoon. But a few days after he was obliged to repair to the field, and the Russians, within a short period, took Marienburg in 1702. Martha fell into the hands of Gen. Tcheremetieff, who relinquished her to Prince Menzikoff. While in his possession she was seen by Peter the Great, who made her his mistress. She became a proselyte to the Greek Church, and assumed the name of Catharine Alexiewna. In 1708 and 1709 she bore the emperor the Princesses Anna and Elizabeth, the first of whom became the Duchess of Holstein by marriage, and mother of Peter III. The second became empress of Russia. In 1712 the emperor publicly acknowledged Catharine as his wife. She was subsequently proclaimed empress, and crowned in Moscow in 1724. Beside the daughters above named she bore the emperor five more children, all of whom died early. The Princesses Anna and Elizabeth were declared legitimate. When Peter, with his army, seemed irreparably lost on the Pruth in 1711 Catharine endeavored to win over the grand vizier; and having succeeded, by bribing his confidant with her jewels, she disclosed her plan to the emperor, who gave it his approbation, and was soon relieved. She afterward received many proofs of the gratitude of her husband. Peter even deemed her worthy of being his successor. But in the latter part of 1724 she fell under his displeasure. Her chamberlain, Moens, with whom she was suspected of being on too intimate terms, was beheaded on pretense that he had been bribed by the enemies of Russia. Menzikoff, who had always manifested much attachment to her, had now been in disgrace for some time, and Peter had very frequent attacks of bodily pain, with intervals only marked by dreadful explosions of rage. These circumstances made Catharine's situation critical, and her anticipations of the future must have been the more melancholy, as the emperor had uttered some threats of a change in the succession to her disadvantage. To prevent such an event she applied to Menzikoff; and by the prudence of Jaguschinski, a reconciliation was effected with the emperor. The empress and the favorite were laboring to confirm their improving prospects when Peter the Great died, 28 Jan. 1725. Catharine, Menzikoff, and Jaguschinski considered it necessary to keep the death of the emperor a secret until, by judicious arrangements, they had secured the succession of the throne to the empress. Theophanes, archbishop of Plescow, swore before the people and troops that Peter on his death-bed had declared Catharine alone worthy to succeed him in the government. She was then

proclaimed empress and autocrat of all the Russias, and the oath of allegiance to her was taken anew. At first the cabinet pursued the plans of Peter, and, under Menzikoff's management, the administration was conducted with considerable ability. But the pernicious influence of favorites was soon felt, and great errors crept into the administration. Catharine died suddenly, her death being probably hastened by excess in the use of ardent spirits.

Catharine II., Empress of Russia: b. Stettin 2 May 1729; d. St. Petersburg 17 Nov. 1796. She was a daughter of the Prince of Anhalt Zerbst and her name was originally Sophia Augusta. The Empress Elizabeth chose her for the wife of Peter, her nephew, whom she appointed her successor. The young princess accompanied her mother to Russia, where she joined the Greek Church, and adopted the name of Catharine Alexiewna, given to her by the empress. The marriage was celebrated 1 Sept. 1745. It was not a happy one, but Catharine found relief in the improvement of her mind. She was endowed with uncommon strength of character; but the ardor of her temperament and the ill treatment of her husband led her into errors which had the most injurious influence on her whole political life. In January 1762, the Empress Elizabeth died, and Peter III. ascended the throne. He lived in the greatest dissipation, and on such intimate terms with a lady of the court, named Elizabeth Woronzoff, that it was generally thought that he would repudiate Catharine and marry his mistress. The empress, therefore, was obliged to take measures for her personal security. At the same time Peter grew continually more and more unpopular with his subjects, which led to a conspiracy, at the head of which were the hetman, Count Rasumowski, Count Panin, the enterprising Princess Daschkoff, and a young officer of the guards, Gregory Orloff. All those who were dissatisfied, or who expected to gain by a change, joined this conspiracy. Panin and the greater part of the conspirators were actuated only by the desire to place the youthful Paul on the throne, under the guardianship of the empress and a council of the empire. But this plan was changed through the influence of the Orloffs. The guards were the first to swear allegiance to the empress on her presenting herself to them at Peterhoff on the morning of 9 July 1762; and Alexei Orloff prevailed on Teplow, afterward appointed senator, to read at the Kazan Church, instead of the proclamation of the conspirators in favor of the young prince, one announcing the elevation of Catharine to the throne. Peter died a few days after in prison. The accusation against Catharine of having contributed to hasten this event is without foundation. The young, ambitious princess, neglected by her husband, whom she did not respect, remained passive on the occasion, yielded to circumstances, which were, it is true, propitious to her, and consoled herself for an event which she could not remedy. She knew how to gain the affections of the people by flattering their vanity; showed great respect for their religion; caused herself to be crowned at Moscow with great pomp; devoted herself to the promotion of agriculture and commerce, and the creation of a naval force; improved the laws; and showed the greatest activity in the administration of the internal as well as the external affairs of Russia. A year after her ascension to the throne she forced the Courlanders to displace their new Duke, Charles of Saxony, and to recall Biren, who was extremely odious to the nobles. After the death of Augustus III., king of Poland, she was the means of Stanislaus Poniatowski's being crowned at Warsaw. But while she was forcing this king on the Poles, the number of the malcontents in her own empire increased, and several attempts against her life were made at St. Petersburg and Moscow. The young Ivan was the person to whom the hopes of the conspirators were directed; but his sudden death at the fortress of Schlüsselburg overthrew the plans of the disaffected. After this the court of the empress was only disturbed from time to time by intrigues, in which gallantry and politics went hand in hand, and which had no other object than to replace one favorite by another. In the midst of pleasure and dissipation Catharine did not neglect the improvement of the laws. Deputies from all the provinces met at Moscow. The empress had herself prepared instructions for their conduct, which were read at the first session; but it was impossible for so many different nations to understand each other, or to be subject to the same laws. Catharine, who presided at the debates, and received from the assembly the title of mother of the country, soon dismissed the discordant legislators. About this time France formed a party in Poland against Russia; but these attempts only served to accelerate Catharine's plans. The war to which the Porte was instigated had the same result. The Turks were beaten. The Russian flag was victorious on the Greek seas; and on the banks of the Neva the plan was formed of re-establishing the republics of Sparta and Athens as a check to the Ottoman power. The advancement of Austrian troops into Poland inspired Catharine with the desire to aggrandize herself in this quarter. She therefore entered into an agreement for the division of the country with the courts of Berlin and Vienna in 1772, by which the governments of Polotzk and Mohilev fell to her share, and she insured to herself exclusive influence in Poland by undertaking to guarantee the Polish constitution. At the same time she abandoned all her conquests, with the exception of Azoph, Taganrog, and Kinburn, in the peace with the Porte, concluded at Kainardschi in 1774, but secured to herself the free navigation of the Black Sea, and stipulated for the independence of the Crimea. By this apparent independence the Crimea, became, in fact, dependent on Catharine. This peace was as opportune as it was advantageous to Russia; for in the third year of the war Moscow and several other cities were desolated by the plague; and about the same time an adventurer named Pugatscheff, assuming the name of Peter III., had excited a revolt in several provinces of eastern Russia, which was soon suppressed. At this time Potemkin exercised an unlimited influence over the empress. In 1784 he succeeded in conquering the Crimea, to which he gave its ancient name of Tauris, and extended the confines of Russia to the Caucasus. Catharine upon this traversed the provinces which had revolted under Pugatscheff, and navigated the Volga and Dnieper, taking greater interest in the expedition, as it

was attended with some danger. She was desirous, likewise, of seeing Tauris. Potemkin turned this journey, which took place in 1787, into a triumphal march. Throughout a distance of nearly 1,000 leagues nothing but feasts and spectacles of various kinds were to be seen. Palaces were raised on barren heaths, to be inhabited for a day. Villages and towns were built in the wildernesses, where a short time before the Tartars had fed their herds. An immense population appeared at every step — the picture of affluence and prosperity. A hundred different nations paid homage to their sovereign. Catharine saw, at a distance, towns and villages, of which only the outward walls existed. She was surrounded by a multitude of people, who were conveyed on during the night, to afford her the same spectacle the following day. Two sovereigns visited her on her journey — the king of Poland, Stanislaus Augustus, and the Emperor Joseph II. The latter renewed his promise, given at St. Petersburg, to assist her in her projects against the Turks. The result was a new Turkish war, which by the Peace of Jassy (1792), ended not less favorably for Russia than the first. The power of Russia was also increased by the war with Sweden which terminated in 1790, and by the last two partitions of Poland and the incorporation of Courland. Catharine took no part in the war against France, though she broke off all connection with the French republic, actively assisted the emigrants, and entered into an alliance with England against France. She likewise made war against Persia, and, as some historians assure us, entertained the project of destroying the power of the English in Bengal, when a fit of apoplexy put an end to her life.

Catharine II. has been equally censured and praised. With all the weakness of her sex, and with a love of pleasure carried to licentiousness, she combined the firmness and talent of a powerful sovereign. Two passions were predominant with her until her death, love and ambition. She was never without her favorite, yet she never lost sight of her dignity. She was distinguished for activity, working with her ministers, writing letters to Voltaire and Diderot, and signing an order to attack the Turks, or to occupy Poland, in the same breath. She favored distinguished authors, and was particularly partial to the French. At Paris she had a literary agent (Baron Grimm). She several times invited Voltaire to her court, proposed to D'Alembert to finish the 'Encyclopædia' at St. Petersburg, and to undertake the education of the grand-duke. Diderot visited her at her request, and she often allowed him the privilege of familiar conversation with her. By these means she gained the favor of the literati of Europe, who called her the greatest of rulers; and, in fact, she was not without claims to this title. She protected commerce, improved the laws, dug canals, founded towns, hospitals, and colleges. Pallas and others traveled at her expense. She endeavored to put a stop to the abuses which had crept into the administration of the different departments of government; but she began without being able to finish. Civilization advanced but slowly in Russia under her reign; and her anxiety to enlighten her subjects ceased when she began to entertain the idea that the French Revolution had been brought about by the progress of civilization. Laws, colonies, schools, manufactures, hospitals, canals, towns, fortifications, everything was commenced, but frequently left unfinished for want of means. See Tooke, 'History of Catharine II.' (1803); Castara, 'Vie de Catherine II.' (1796); Tannenberg, 'Leben Catherinens II.' (1797); Herzen, 'Mémoires de l'Impératice Catharine II.' (1859).

Catharine Howard, Queen of England. See HOWARD, CATHARINE.

Catharine Parr. See PARR, CATHARINE.

Catharine Paulowna, pow-löf'na, Queen of Würtemberg: b. 21 May 1788; d. 9 Jan. 1819. She was a daughter of Paul I. of Russia, and in 1809 married George, Duke of Holstein Oldenburg. After his death in 1812, she accompanied her brother, Alexander, on his campaigns in Germany and France (1813–14), to Paris, London, and the congress of Vienna (1815), assisting him by her talents and resolute spirit. The marriage of her younger sister to the Prince of Orange is said to have been effected by her influence. In 1816 she married William, Crown Prince of Würtemberg, whose acquaintance she had made during her travels. During the famine of 1816 in that country she proved her benevolence by the formation of female associations and an agricultural society. She was active in promoting the education of the people.

Catharine of Ar'agon, Queen of England, the youngest daughter of Ferdinand of Aragon and Isabella of Castile: b. Alcalá de Henares, Spain, 15 Dec. 1485; d. Kimbolton, Huntingdonshire, 7 Jan. 1536. In 1501 she was married to Arthur, Prince of Wales, son of Henry VII. Her husband dying about five months after, the king, unwilling to return her dowry, caused her to be contracted to his remaining son, Henry, and a dispensation was procured from the Pope for that purpose. In his 15th year the Prince made a public protest against the marriage; but at length yielding to the representations of his council, he consented to ratify the contract, and on his accession to the throne in 1509 was crowned with her. The inequality of their ages and the capricious disposition of Henry were circumstances very adverse to the durability of their union, and it seems surprising that Catharine should have acquired and retained an ascendancy over the affections of the king for nearly 20 years. The want of male issue, however, proved a source of disquietude to him, and scruples, real or pretended, at length arose in his mind concerning the legality of their union, which were greatly enforced by a growing passion for Anne Boleyn, one of the queen's maids of honor. He made application to Rome for a divorce from Catharine. But all that Henry could obtain at Rome was a promise to investigate the case. Catharine, meanwhile, conducted herself with gentleness and firmness, and could not in any way be induced to consent to an act which would render her daughter illegitimate, and stain her with the imputation of incest. Being cited before the papal legates, Cardinals Wolsey and Campeggio, in 1529, she declared that she would not submit her cause to their

judgment, but appealed to the court of Rome; which declaration was declared contumacious. His failure to secure the sanction of the Pope to the divorce induced the king to decide the affair for himself; and the condemnation of his conduct expressed on this occasion by the court of Rome provoked him to throw off his submission to it, and declare himself head of the English Church — an act of royal caprice more important than most in history. In 1532 he married Anne Boleyn; upon which Catharine, no longer considered queen of England, retired to Ampthill in Bedfordshire. Cranmer, now raised to the primacy, pronounced the sentence of divorce, notwithstanding which Catharine still persisted in maintaining her claims. Shortly before her death she wrote a letter to the king, recommending their daughter (afterward Queen Mary) to his protection, praying for the salvation of his soul, and assuring him of her forgiveness and unabated affection. The pathos of this epistle is said to have drawn tears from Henry. He had never presumed to call the virtues of his injured wife in question, and she certainly acted throughout with eminent dignity and consistency. Several devotional treatises have been attributed to Catharine which belong to Queen Catharine Parr.

Catharine of Braganza, brä-gän'zä, wife of Charles II., king of England, and daughter of John IV., king of Portugal: b. Villa Viçosa, Portugal, 25 Nov. 1638; d. Portugal 31 Dec. 1705. In 1662 she married Charles II., in whose court she long endured all the neglect and mortification to which his dissolute conduct necessarily exposed her, and which became still more galling from her having no children; still she conducted herself with great equanimity, and after the death of Charles, received much attention and respect. In 1693 she returned to Portugal, where, in 1704, she was made regent by her brother, Don Pedro, whose increasing infirmities rendered retirement necessary. In this situation Catharine showed considerable abilities, carrying on the war against Spain with great firmness and success.

Catharine of France. See CATHARINE OF VALOIS.

Catharine de Medici, dā mā'dā-chē, Queen of France: b. Florence 1519; d. Blois, France, 5 Jan. 1589. She was the only daughter of Lorenzo de Medici, Duke of Urbino, and the niece of Pope Clement VII. Francis I. consented that his son, Henry, should marry her only because he did not believe she ever would ascend the throne, and because he was in great want of money, with which Lorenzo could furnish him. The marriage was celebrated at Marseilles in 1533. Catharine was equally gifted with beauty and talents, and had cultivated her taste for the fine arts in Florence; but at the same time imbibed the perverted principles of politics then prevailing in Italy. Catharine's ambition was unbounded. She sacrificed France and her children to the passion for ruling; but she never aimed steadily at one great end, and had no profound views of policy. The situation in which she was placed, on her arrival at the French court, gave her great opportunity to perfect herself in the art of dissimulation. She flattered alike the Duchess d'Etampes, the mistress of the king, and Diana de Poitiers, the mistress of her own husband, though these two ladies hated each other. From her apparent indifference she might have been supposed inclined to shun the tumult of public affairs; but when the death of Henry II. in 1559 made her mistress of herself, she plunged her children in a whirl of pleasures, partly to enervate them by dissipation, partly from a natural inclination toward prodigality; and in the midst of these extravagances cruel and bloody measures were executed, the memory of which still makes men shudder. Her authority was limited under the reign of Francis II., her eldest son, who, in consequence of his marriage with the unfortunate Mary Stuart, was entirely devoted to the party of the Guises. Jealous of a power she did not exercise, Catharine then decided to favor the Protestants. If it had not been for her patronage, by which the ambition of the chiefs of the Huguenots was stimulated, the conflicting religious opinions in France never would have caused such lasting civil wars. Catharine felt herself embarrassed by this indulgence toward the innovators, when the death of Francis II. placed the reins of government, during the minority of Charles IX., in her hands. Wavering between the Guises on one side, who had put themselves at the head of the Roman Catholics, and Condé and Coligny on the other, who had become very powerful by the aid of the Protestants, she was constantly obliged to resort to intrigues, which failed to procure her as much power as she might easily have gained by openness of conduct. Despised by all parties, but consoled if she could deceive them; taking arms only to treat, and never treating without preparing the materials for a new civil war, she brought Charles IX., when he became of age, into a situation in which he must either make the royal authority subordinate to a powerful party, or cause part of his subjects to be massacred, in the hope, at best a doubtful one, of subduing faction. The massacre of St. Bartholomew was her work. She induced the king to practise a dissimulation foreign to his character; and as often as he evinced a disposition to free himself from a dependence of which he was ashamed, she knew how to prevent him, by the fear and jealousy which she excited in him by favoring his brother Henry. After the death of Charles IX. Catharine became again regent of the kingdom, till the return of Henry III., then king of Poland. She contributed to the many misfortunes of his reign by the measures which she had adopted previously to its commencement, and by the intrigues in which she was uninterruptedly engaged. At her death, France was in a state of complete dismemberment. The religious contests were in reality very indifferent to her. The consequences she was not able to conceive. She was ready to risk life for the gratification of her ambition. She was equally artful in uniting her adherents, and in promoting dissension among her adversaries. To those who directed her attention to the prodigal expenditure of the public treasure, she used to say, «One must live.» Her example contributed greatly to promote the corruption of morals which prevailed in her time. Her manners, however, were elegant, and she took a lively interest in the sciences and arts. She procured valuable manuscripts from Greece and Italy, and

caused the Tuileries and the Hotel de Soissons to be built. In the provinces, also, several castles were erected by her order, distinguished for the beauty of their architecture, in an age when the principles of the art were still unknown in France. She had two daughters, Elizabeth, married to Philip II. of Spain in 1559, and Margaret of Valois, married to Henry of Navarre, afterward Henry IV. See Alben, 'Vita di Caterina di Medici' (1834); La Ferrière, 'Lettres de Catherine de Medicis' (1880–5).

Catharine of Valois, văl'wä, Queen of England, youngest child of Charles VI. and Isabella of Bavaria: b. Paris 27 Oct. 1401; d. 3 Jan. 1438. In 1420 she was married to Henry V. of England, who was then declared successor to the crown of France. To this prince she bore Henry VI., crowned in his cradle king of both countries. After the death of Henry, in 1422, Catharine privately married Owen Theodore, or Tudor, a Welsh gentleman of small fortune, but descended from the ancient British princes. By this marriage she had two sons, the eldest of whom, Edmund, earl of Richmond, by a marriage with Margaret Beaufort, of the legitimated branch of Lancaster, became father of Henry VII. and founder of the house of Tudor.

Catharine-wheel, a window or compartment of a window of circular form, sometimes with radiating divisions or spokes, used in mediæval buildings, called a rose, or marigold window. It is a memorial of St. Catharine's martyrdom. The term is also applied to a kind of firework in the shape of a wheel, made to revolve automatically when lighted; a pinwheel.

Cathar'tic, any remedy that will cause an emptying of the intestinal canal. For purposes of general description there are four classes of cathartics. These are mild cathartics, or laxatives; simple purges, drastic purges, and hydragogues. Catharsis is accomplished either by increasing the amount of water in the intestines or by stimulating the movements of the intestines — peristalsis. The laxatives are water, sugar, honey, fruits, stringy vegetables, coarse bread, cassia fistula, sulphur, figs, etc.; these act either by giving bulk, stimulation of peristalsis, or by adding water, all of the sugars attracting water from the intestinal wall. The simple purges act usually by stimulating peristalsis. These are castor oil, cascara sagrada, rhubarb, aloes, senna, iris, podophyllum, leptandra, calomel, etc. The drastic purges stimulate peristalsis, and many of them cause a flow of water into the intestine. The simple purges in large doses are drastic. Gamboge, jalap, colocynth, scammony, croton oil, and elaterium are drastics. Another class of cathartics are salty, and by osmosis attract water into the intestines; they thus act as hydragogues and are termed the saline cathartics. Those most commonly used are epsom salts, rochelle salts, magnesium oxide, citrate, sodium phosphate, tartrate, and bitartrate. Most of the mineral waters belong to this class of cathartic. In former times cholagogues were described as cathartics that "stirred up the liver scretions." It is now fairly well recognized that those drugs that stimulate peristalsis affect the gall bladder, causing it to empty itself more actively, and that the liver is unaffected. The only true hepatic stimulant that is now recognized is ox-gall. This is frequently employed as a cathartic. Abuse of cathartics is an evil above all description. It is almost safe to assert that the injudicious use of the many patent cathartic pills on the market is responsible for more intestinal trouble than any other agent. They teach people to be careless of their intestinal functions and work incalculable injury. See CONSTIPATION.

Cathartidæ, the American vultures, a family of birds of the order *accipitres* or *Raptores,* differing from the more eagle-like Old World vultures (*Vulturidæ*) in having the beak comparatively slender, straight, and blunt, the complete absence of a septum between the nostrils, the much more largely naked head and neck, and the weak feet with elevated hallux and little curved claws. Altogether they are less predaceous birds, which feed exclusively on carrion or attack weakling animals. Five genera, each with but one or a few species, are found in America, more especially in the warmer parts. Among them are the carrion crow, the condor, and the turkey buzzard (qq.v.).

Cathay, kăth-ā', a name of which Marco Polo designated a part of Asia, probably north China.

Cath'cart, SIR George, son of William Shaw Cathcart (q.v.): b. London 12 May 1794; d. Inkerman, Crimea, 5 Nov. 1854. He entered the Life Guards in 1810, accompanied his father as attaché to Russia, and subsequently acted as aide-de-camp to the Duke of Wellington at Waterloo. He served in Nova Scotia and the West Indies, quelled the rebellion in Canada in 1837, and was appointed in 1852 governor at the Cape of Good Hope, where he showed ability in subduing the Kaffir insurrection. On the outbreak of the Crimean war great things were expected of him, but he fell as divisional commander at Inkerman.

Cathcart, William Shaw, EARL OF, English soldier and diplomatist: b. Petersham, England, 17 Sept. 1755; d. near Glasgow 17 June 1843. He studied at Glasgow, then entered the army, and served with distinction first in the American war and afterward in the campaigns against the French republic in Flanders and Germany. In 1801 he was made lieutenant-general, and in 1803 commander-in-chief for Ireland. In 1807 he was appointed commander of the land forces in the expedition against Copenhagen, and was created a viscount for his services on this occasion. In 1812 he proceeded to Russia as minister-plenipotentiary, joined the Emperor Alexander at the headquarters of the Russian army, and accompanied him through the campaigns of 1813–14. He entered Paris with the allied sovereigns, and was present at the Congress of Vienna. The same year he was created an earl. Subsequent to this he resided for several years at St. Petersburg as ambassador to the Russian court.

Cathe'dral (Lat. *cathedra,* a "seat." Thus, "to speak ex cathedra," is to speak as from a seat of authority). A cathedral city is the seat of the bishop of the diocese, and his throne is placed in the cathedral church. From the early times of the Christian Church the bishop presided in the presbytery or the assembly of priests. He was seated on a chair, a little higher than that of the others. The whole meeting of priests was called *cathedra;* and at a later period,

when Christians were allowed to build churches, this name was applied to the episcopal churches, and the name *basilica* to the particular churches erected in honor of a saint or a martyr. The distinction between cathedral and collegiate churches consists principally in the see of the bishop being at the former. The governing body of a cathedral is called the dean and chapter. The cathedral is commonly, though not invariably, the most important church building, architecturally speaking, in the diocese. Its usual form is a Latin or Greek cross, and from the comparatively simple outline of the early Christian basilica has been evolved in time the complex cathedral structure of the Middle Ages. In its outline a typical cathedral exhibits nave with north and south aisles, transepts with eastern and western aisles, choir with aisles north and south, retro-choir, and eastern Lady Chapel, a lantern tower at the crossing and two towers flanking the west end of the nave. French cathedrals are distinguished by their great height, chevets, or apsidal east ends with a corona of chapels, elaborate and logical vaulting system, and, in the later Gothic styles, by extremely profuse adornment. The portals of French churches generally are lofty and imposing and richly sculptured. English cathedrals are much longer and lower than French ones, their east ends are usually square and their portals small, and, as at Wells, even insignificant.

The Church of St. John of Lateran, at Rome, founded by Constantine, is the Episcopal church or cathedral of the Pope, and bears over its chief portal the inscription, *Omnium urbis et orbis ecclesiarum mater et caput*, "mother and head of all the churches of Rome and the world." At its chief altar none but the Pope can read mass, for it covers another ancient altar at which the apostle Peter is said to have officiated. The basilica of St. Peter's at Rome may be mentioned as surpassed by no cathedral in antiquity and splendor, and equaled by none in magnitude. The length of the interior is 613½ feet, width at transept 446½ feet, height of nave 153 feet. The cathedral at Cologne was begun in the middle of the 13th century, and only partly finished in 1509, after which work was not resumed on it till 1830. In 1863 the interior was thrown open to the public. In 1880 it was finished. The structure is 511 feet long and 231 feet wide. The towers are 501 feet high. The cathedral of Dantzig was commenced in 1343 and finished in 1503. Its length is 358 feet and its height 230 feet. Notre Dame, Antwerp, was begun toward the close of the 14th century; its length is 390 feet and its width 250 feet. The cathedral at Rheims was begun in 1211 and finished in 1430. It is 466 feet long. The cathedral at Amiens dates from 1220, and is 469 feet long, with a central spire 422 feet high. The cathedral at Strasburg was completed in 1601, and is one of the grandest Gothic structures in Europe. Its spire is 466 feet high. Notre Dame, Paris, was begun about 1163. Its length is 390 feet, width of transept 144 feet, height of vaulting 105 feet, of western towers 224 feet, width of front 128 feet, and length of nave to transept 186 feet. Salisbury Cathedral, England, founded 1220, finished in 1258, is a fine specimen. Its plan is a double cross, in extreme length, 474 feet, width of greater transept, 230 feet. Canterbury Cathedral, founded shortly after the Conquest, is 545 feet long and the greater transept, 170 feet. It has three towers, the central one being 230 feet high. The crypts, which extend under the whole structure, are the finest in England. Ely Cathedral is 516 feet long and 190 feet wide. Lincoln Cathedral is 524 feet long outside and 482 inside. The central tower is 300 feet high. The cathedral at York is 524 feet long, 250 feet wide, and has a superb central tower. The nave is 264 feet long, 106 feet wide, and 93 feet high. St. Paul's, London (the present edifice, the first having been destroyed in the great fire of 1666), was begun in 1675, and finished in 1710. It is built in the form of a Latin cross, and is 514 feet in length. The transept is 286 feet long, and the west front 180 feet wide. The campanile towers at the west end are each 222 feet in height. The dome is 365 feet from the ground, 356 feet from the floor of the building, 145 feet in diameter, and 404 feet from the ground to the top of the cross. The Cathedral of St. Peter and St. Paul, Philadelphia, has a dome 210 feet high. At Baltimore the Roman Catholic Cathedral is 190 feet long, 177 feet wide, and 127 feet high to the top of the cross. St. Patrick's Cathedral, New York, is 332 feet long and 132 feet in general width, with an extreme width at the transept of 174 feet. It has two tall spires at the west end and is designed after the most elaborate examples of French Gothic. The Cathedral of Notre Dame, Montreal, Canada, is 255 feet long, 135 feet wide, and has two towers, each 220 feet high. The Cathedral of Mexico was begun in 1573, and was finished in 1667. It is 500 feet long and 420 feet wide. The cathedral of Lima is 320 feet long and 180 feet wide. The cathedral of St. John the Divine (Protestant Episcopal) in New York, will, when completed, be the most ambitious structure of the kind on this continent. The cathedrals of Glasgow and Kirkwall are the only complete and entire cathedrals in Scotland, exclusive of modern edifices so called. See Addis, 'Cathedrals of Scotland'; Bell, 'Cathedral Series'; Bell, 'Handbooks to Continental Churches'; Bond, 'English Cathedrals'; Gilchrist and Perkins, 'Itinerary of English Cathedrals'; Van Rensselaer, 'English Cathedrals'; Wilson, 'Cathedrals of France.'

Cathe'dral, The, a poem by James Russell Lowell. The particular cathedral which suggested the thought of the poem is that of Chartres.

Cathedral Peak, a peak of the Sierra Nevada range, situated in Mariposa County, Cal. It is of granite formation and contains the source of the Merced River. It is 11,000 feet high.

Cathelineau, Jacques, zhăk kā-tē-lē-nō, French Vendean general: b. Pin-en-Mauge, Anjou, 5 Jan. 1759; d. 11 July 1793. On the breaking out of the French Revolution he was living quietly with his family, when an unforeseen event suddenly called him forth from obscurity. In March 1793, during the levy of the conscription which the national assembly had decreed, the youth of the district of St. Florent rose in insurrection, and put the officials and *gens d'armes* to flight. They then returned home, and were awaiting the terrible revenge of the Republicans, when news of the outbreak reached

Cathelineau. He instantly determined to put himself at the head of his countrymen. Causing the alarm-bell to be rung in different places, he was soon followed by almost all the men capable of bearing arms, surprised several republican posts, carried off their cannon, and now mustered several thousand strong. As he did not deem himself equal to the post of commander, he placed himself under Bonchamp and Elbée, but after the victory of Saumur, 9 June 1793, was formally invested as commander-in-chief. On this he resolved to make a decisive attack on Nantes, and appeared before it with 80,000 men, still further increased by 30,000, whom Charette brought from lower Poitou Notwithstanding these vast numbers, and the greatest display of undisciplined gallantry, the attack was repulsed, and Cathelineau died shortly after of the severe wounds which he had received.

Cath'erine. See CATHARINE.

Catherine Harbor, Russia, a port in the northwestern part of the empire on the Murman coast of the Kola peninsula. It was formally opened in 1900, the city having been built by imperial command. It is primarily a naval station, the harbor being a mile and a half long, 1,600 feet wide, and 70 to 160 feet deep. The port is ice free.

Cath'erine's, St., or **Santa Catharina,** an island close to the coast of Brazil, between lat. 27° and 28° S., and belonging to the province or state of Santa Catharina. It is 37 miles long and 10 broad, and contains Desterro, the state capital.

Cath'erwood, Mary Hartwell, American novelist: b. Luray, Ohio, 16 Dec. 1847; d. Chicago, Ill., 26 Dec. 1902. She was graduated from the Female College, Granville, Ohio, in 1868 and was married to John Steele Catherwood in 1887. Her especial field was the romance of American history and her writings include 'Old Caravan Days'; 'Craque-o'-Doom' (1881); 'The Romance of Dollard' (1889); 'The Story of Tonty' (1890); 'A Woman in Armor'; 'The Lady of Fort St. John' (1891); 'The Chase of St. Castin, and Other Tales' (1894); 'The Spirit of an Illinois Town' (1897); 'The White Islander'; 'Old Kaskaskia' (1893); 'The Days of Jeanne d'Arc'; 'Bony and Ban'; 'Mackinac and Lake Stories'; 'Spanish Peggy'; 'Lazare' (1902).

Cath'eter, any tubular organ used to insert into a mucous canal or hollow organ. Thus, there are nasal catheters for the nose, eustachian catheters for the internal ear, urinary catheters for the bladder. This latter is the more frequently used. Great care should be exercised in its use, that it be kept clean, to avoid cystitis (q.v.).

Cathetom'eter, in physics, an instrument for the exact measurement of small vertical distances. In its usual form it consists of a horizontal telescope, mounted so as to slide upon a fixed, graduated, upright support or post. The telescope is raised or lowered until its cross-hairs coincide with one of the objects whose difference in height is to be determined, and the position of the telescope upon the vertical, graduated post is noted by means of a vernier or micrometer. The telescope is then brought to the elevation of the second object in the same way, and the difference in the two readings gives the desired difference in height. A cathetometer that is well designed and constructed is an instrument capable of giving very precise results when in the hands of a skilful observer. It is greatly used in accurate barometry, for determining the height of the barometric column above the mercury in the cistern.

Cath'ode, that part of a galvanic battery by which the electric current leaves substances through which it has passed, or the surface at which the electric current passes out of the electrolyte; the negative pole.

Cathode Rays. See ETHER; MOLECULAR THEORY; RADIATION; etc.

Catholic Apostolic Church, a body of Christian believers which arose in Great Britain in 1835, consisting at first of the members of a congregation of a Scotch Presbyterian Church in London and their pastor, Edward Irving (q.v.), who separated themselves from that communion and effected a new church organization under the above name. They are also commonly designated as Irvingites. They regarded the gifts or *charismata,* which were divinely bestowed upon the first Christians — "the word of wisdom, gifts of healing, workings of miracles, prophecy, discernings of spirits, divers kinds of tongues, interpretation of tongues" — and the phenomena witnessed at the assembly of the faithful when the Spirit descended upon the 11 apostles, not as extraordinary and pertaining to the Church in that time only, but as the normal manifestations of the presence of the Spirit in the assembly of the believers when they have a living faith. The little flock were confirmed in their belief by reports of occurrences in many respects like those of which the apostle Paul speaks in his first letter to the church of Corinth, quoted above — reports which were vouched for as simply true by some members of Mr. Irving's congregation who made an investigation of the phenomena. The scene of these manifestations was a meeting-house at Port Glasgow, Scotland. The gifts displayed were those of "tongues" and "prophesying." The governing body of the Scotch Presbyterian Church deposed Mr. Irving from the ministry, and shortly afterward he died. But his people persisted in their beliefs, and laid the broad foundations of the Catholic Apostolic Church. It has 4 ministries: apostles, prophets, evangelists, and pastors, each comprising 12 members. These 48 preside over the "12 tribes" of the universal Church. Each congregation, normally numbering 500 adult communicants, has its "angel" or bishop, under whom are 24 priests, 6 of each of the 4 orders or ministries of apostles, prophets, evangelists, and pastors, besides elders, deacons for the temporal affairs, and a corps of subdeacons, acolytes, singers, and doorkeepers. In the daily religious services at 6 and 9 A.M., and 3 and 5 P.M., the "low celebration," the matins, the vespers, the "proposition" of the sacrament; the "high celebration" at 10 A.M. Sundays at the "high altar"; the use of vestments, lights, incense, holy oil, etc., in all these respects the Catholic Apostolic Church aims at as pronounced a ritualism as is seen in a Cath-

olic cathedral. The ministry with their coadjutors are supported by tithes contributed by the faithful. The Catholic Apostolic Church has spread abroad widely, claiming to have organizations in Germany, France, Switzerland, Belgium, Russia, Denmark, Sweden, Australia, India, Ireland, and the United States. The statistics of religions compiled for the New York 'Independent' in 1902 show that then it had in the United States, 95 ministers, 10 churches, and 1,394 communicants.

Catholic Benevolent Legion, a fraternal society for Roman Catholic laymen, designed to afford to the members facilities for intellectual improvement, social advancement, and such other advantages as are offered by similar non-Catholic fraternities. It was organized in 1881 and incorporated under the laws of the State of New York with 11 charter members. Twenty years later the society had 50,000 active members, and had paid to widows and orphans of 6,200 deceased members the sum of $12,000,000. The organization is incorporated under the style of The Supreme Council, Catholic Benevolent Legion, and to the Supreme Council final appeal is made on all matters of importance emanating from State or subordinate councils. Male Roman Catholics who are personally acceptable, of sound bodily health, and between the ages of 18 and 55, are alone eligible to membership. There is a relief fund on behalf of sick and distressed members, and a benefit fund, out of which a sum not exceeding $5,000 is paid to the beneficiaries of deceased members, and a sum not exceeding $2,500 to a member who is permanently disabled. A subordinate council of the Catholic Benevolent Legion may be formed in any congregation or parish; a charter is granted by the Supreme Council to a group of 15 or even of 7 eligible persons who associate themselves with a view to enter the fraternity. The organization has the express approval of the Pontiff and of all the archbishops and bishops in whose jurisdictions councils of the fraternity have been formed.

Catholic Church, a phrase signifying the universal Church, the whole body of true believers in Christ; but the term is often used as equivalent to the Roman or Western Church. Like most other words used in ecclesiology, the term Catholic was borrowed at first from the New Testament. It occurs in some editions of the Greek original — including that issued in connection with the last revision — in the titles prefixed to the Epistles of James, 1 and 2 Peter, 1 John, and Jude, and is the word translated "general" in the King James Bible. The first to apply it to the Church was the Apostolic Father Ignatius. When he and his successors used it they meant to indicate that the Church of which they constituted a part, comprised the main body of believers, and was designed, as it was entitled, to be universal. In this sense the Church was opposed to the sects and separate bodies of heretics who had separated themselves from it and were now outside its pale. When, in the 8th century, the separation between the Eastern and Western Churches took place, the latter retained as one of its appellations the term "Catholic," the Eastern Church being contented with the word "Orthodox," still used by the Russian emperors in their politico-ecclesiastical manifestos. When the Protestant churches separated from their communion with Rome in the 16th century, those whom they had left naturally regarded them as outside the Catholic pale. They, on the other hand, declined to admit that this was the case, and the term "Catholic Church" is used in the English Liturgy apparently in the sense of all persons making a Christian profession.

Catholic Church, Beneficent Effects of The. We live and move and have our being in the midst of a civilization which is the legitimate offspring of the Catholic religion. The blessings resulting from our Christian civilization are poured out so regularly and so abundantly on the intellectual, moral and social world, like the sunlight and the air of heaven and the fruits of the earth that they have ceased to excite any surprise except to those who visit lands where the religion of Christ is little known. In order to realize adequately our favored situation we should transport ourselves in spirit to ante-Christian times and contrast the condition of the pagan world with our own. Before the advent of Christ, the whole world, with the exception of the secluded Roman province of Palestine, was buried in idolatry. Every striking object in nature had its tutelary divinities. Men worshipped the sun and moon and stars of heaven. They worshipped their very passions. They worshipped everything except God only, to whom alone divine homage is due. In the words of the Apostle of the Gentiles, "They changed the glory of the incorruptible God into the likeness of corruptible man, and of birds and beasts and creeping things. They worshipped and served the creature rather than the Creator who is blessed forever."

But at last the great Light for which the prophets of Israel had sighed and prayed, and toward which even the pagan sages had stretched forth their hands with eager longing, arose and shone unto them "that sat in darkness and in the shadow of death." The truth concerning our Creator, which had hitherto been hidden in Judea, that there it might be sheltered from the world-wide idolatry, was now proclaimed, and in far greater clearness and fullness, unto the whole world. Jesus Christ taught all mankind to know the one true God, a God existing from eternity unto eternity, a God who created all things by his power, who governs all things by his wisdom, and whose superintending providence watches over the affairs of nations as well as of men, "without whom not even a bird falls to the ground." He proclaimed a God infinitely holy, just, and merciful. This idea of the Deity, so consonant to our rational conceptions, was in striking contrast with the low and sensual notions which the pagan world had formed of its divinities. The religion of Christ imparts to us not only a sublime conception of God, but also a rational idea of man and of his relations to his Creator. Before the coming of Christ, man was a riddle and a mystery to himself. He knew not whence he came or whither he was going. He was groping in the dark. All he knew for certain was that he was passing through a brief phase of existence. The past and the future were enveloped in a mist which the light of philosophy was unable to penetrate. Our Redeemer has dis-

pelled the cloud and enlightened us regarding our origin and destiny and the means of attaining it. He has rescued man from the frightful labyrinth of error in which paganism had involved him.

The Gospel of Christ as propounded by the Catholic Church has brought not only light to the intellect, but comfort also to the heart. It has given us "that peace of God which surpasseth all understanding," the peace which springs from the conscious possession of the truth. It has taught us how to enjoy that triple peace which constitutes true happiness as far as it is attainable in this life; peace with God by the observance of his commandments, peace with our neighbor by the exercise of justice and charity toward him, and peace with ourselves by repressing our inordinate appetites, and by keeping our passions subject to the law of reason, and our reason illumined and controlled by the law of God.

All other religious systems prior to the advent of Christ were national like Judaism, or state religions like paganism. The Catholic religion alone is world-wide and cosmopolitan, embracing all races and nations and peoples and tongues. Christ alone, of all religious founders, had the courage to say to his disciples, "Go teach all nations; preach the gospel to every creature. You shall be witnesses unto me in Judea and Samaria and even to the uttermost bounds of the earth. Be not restrained in your mission by national or state lines; let my gospel be as free and universal as the air of heaven. The earth is the Lord's and the fullness thereof. All mankind are the children of my Father and are my brethren. I have died for all, and embrace all in my charity. Let the whole human race be your audience and the world be the theatre of your labors."

It is this recognition of the fatherhood of God and the brotherhood of Christ that has inspired the Catholic Church in her mission of love and benevolence. This is the secret of her all-pervading charity. This idea has been her impelling motive in her work of the social regeneration of mankind. I behold, she says, in every human creature, a child of God and a brother or sister of Christ and therefore I will protect helpless infancy and decrepit old age. I will feed the orphan and nurse the sick. I will strike the shackles from the feet of the slave and will rescue degraded woman from the moral bondage and degradation to which her own frailty and the passions of the stronger sex had consigned her. Montesquieu has well said that the religion of Christ, which was instituted to lead men to eternal life, has contributed more than any other institution to promote the temporal and social happiness of mankind. Let us briefly review what the Catholic Church has done for the elevation and betterment of society.

1. The Catholic Church has purified society in its very fountain, which is the marriage bond. She has invariably proclaimed the unity and sanctity and indissolubility of the marriage tie by saying with her founder, "What God hath joined together, let no man put asunder." Wives and mothers should never forget that the inviolability of the marriage contract is the palladium of their womanly dignity and their Christian liberty. And if they are no longer the slaves of man and the toy of his caprice, like wives in Asiatic countries, but the peers and partners of their husbands; if they are no longer tenants at will like the wives of pagan Greece and Rome, but the mistresses of the household; if they are no longer confronted by usurping rivals like Mohammedan and Morman wives, but the queens of the domestic kingdom, they are indebted for this priceless boon to the ancient Church, and particularly to the Roman pontiffs, who inflexibly upheld the sacredness of the nuptial bond against the arbitrary power of kings, the lust of nobles, and the lax and pernicious legislation of civil government.

2. The Catholic religion has proclaimed the sanctity of human life as soon as the body is animated by the vital spark. Infanticide was a dark stain in pagan civilization. It was universal in Greece with the possible exception of Thebes. It was sanctioned and even sometimes enjoined by such eminent Greeks as Plato and Aristotle, Solon and Lycurgus. The destruction of infants was also very common among the Romans. Nor was there any legal check to this inhuman crime except at rare intervals. The father had the power of life and death over his child. And as an evidence that human nature does not improve with time, and is everywhere the same unless it is fermented with the leaven of Christianity, the wanton sacrifice of infant life is probably as general to-day in China and other heathen countries as it was in ancient Greece and Rome. The Catholic Church has sternly set her face against this exposure and murder of innocent babes. She has denounced it as a crime more revolting than that of Herod, because committed against one's own flesh and blood. She has condemned with equal energy the atrocious doctrine of Malthus, who suggested unnatural methods for diminishing the population of the human family. Were I not restrained by the fear of offending modesty, and of imparting knowledge where "ignorance is bliss," I would dwell more at length on the social plague of ante-natal infanticide, which is insidiously and systematically spreading among us in defiance of civil penalties and of the divine law which says "Thou shalt not kill."

3. There is no phase of human misery for which the Church does not provide some remedy or alleviation. She has established infant asylums for the shelter of helpless babes who have been cruelly abandoned by their own parents, or bereft of them in the mysterious dispensation of Providence before they could know and feel a mother's love. These little waifs, like the infant Moses drifting on the turbid Nile, are rescued from an untimely death, and are tenderly raised by the daughters of the great King, those consecrated virgins who become nursing mothers to them. And I have known more than one such motherless babe, who like Israel's lawgiver, in after years became a leader among his people.

4. As the Church provides homes for those yet on the threshold of life, so too does she secure retreats for those on the threshold of death. She has asylums in which the aged, men and women, find at one and the same time a refuge in their old age from the storms of life, and a novitiate to prepare them for eternity. Thus, from the cradle to the grave she is a loving mother. She rocks her children in the cradle of infancy, and she soothes them to rest on the couch of death.

Louis XIV. erected in Paris the famous Hôtel des Invalides for the veteran soldiers of France who had fought in the service of their country. And so has the Catholic religion provided for those who have been disabled in the battle of life, a home in which they are tenderly nursed in their declining years by devoted sisters. The Little Sisters of the Poor, whose congregation was founded in 1840, have now charge of 250 establishments in different parts of the globe, the aged inmates of those houses numbering 30,000, and upward of 70,000 having died under their care up to 1889. To these asylums are welcomed not only the members of the Catholic religion, but those also of every form of Christian faith, and even those without any faith at all. The sisters make no distinction of person or nationality or color or creed; for true charity embraces all. The only question proposed by the sisters to the applicant for shelter is this: "Are you oppressed by age and penury? If so, come to us and we will provide for you."

5. She has orphan asylums where children of both sexes are reared and taught to become useful and worthy members of society.

6. Hospitals were unknown to the pagan world before the coming of Christ; the copious vocabularies of Greece and Rome had no word even to express that term. The Catholic Church has hospitals for the treatment and care of every form of disease. She sends her daughters of charity and of mercy to the battlefield and to the plague-stricken city. During the Crimean war I remember to have read of a sister who was struck dead by a ball while she was in the act of stooping down and bandaging the wound of a fallen soldier. Much praise was then deservedly bestowed on Florence Nightingale for her devotion to the sick and wounded soldiers. Her name resounded in both hemispheres. But in every sister you have a Florence Nightingale with this difference, that like ministering angels they move without noise along the path of duty, and like the angel Raphael, who concealed his name from Tobias, the sister hides her name from the world.

Several years ago I accompanied to New Orleans eight sisters of charity who were sent from Baltimore to reinforce the ranks of their heroic companions or to supply the places of their devoted associates who had fallen at the post of duty in the fever-stricken cities of the South. Their departure for the scene of their labors was neither announced by the press nor heralded by public applause. They rushed calmly into the jaws of death, not bent on deeds of destruction like the famous "six hundred," but on deeds of mercy. They had no Tennyson to sound their praises. Their only ambition was — and how lofty is that ambition! — that the recording angel might be their biographer, that their names might be inscribed in the Book of Life, and that they might receive their recompense from him who has said: "I was sick and ye visited me; for as often as ye did it to one of the least of my brethren, ye did it to me." Within a few months after their arrival, six of the eight sisters died victims of the epidemic.

These are a few of the many instances of heroic charity that have fallen under my own observation. Here are examples of sublime heroism not culled from the musty pages of ancient martyrologies, or of books of chivalry, but happening in our own day and under our own eyes. Here is a heroism not aroused by the emulation of brave comrades on the battlefield, nor by the clash of arms or the strains of martial hymns, nor by the love of earthly fame, but inspired only by a sense of Christian duty and by the love of God and of fellow beings.

7. The Catholic religion labors not only to assuage the physical distempers of humanity, but also to reclaim the victims of moral disease. The redemption of fallen women from a life of infamy was never included in the scope of heathen philanthropy, and man's unregenerate nature is the same now as before the birth of Christ. He worships woman as long as she has charms to fascinate; but she is spurned and trampled upon as soon as she has ceased to please. It was reserved for him who knew no sin to throw the mantle of protection over sinning woman. There is no page in the gospels more touching than that which records our Saviour's merciful judgment on the adulterous woman. The scribes and Pharisees, who had perhaps participated in her guilt, asked our Lord to pronounce sentence of death upon her in accordance with the Mosaic law. "Hath no one condemned thee?" asked our Saviour. "No one, Lord," she answered. "Then," said he, "neither will I condemn thee. Go, sin no more." Inspired by this divine example, the Catholic Church shelters erring females in homes not inappropriately called Magdalen asylums and houses of the Good Shepherd. Not to speak of other institutions established for the moral reformation of women, the Congregation of the Good Shepherd at Angers, founded in 1836, has charge to-day of 150 houses, in which upward of 4,000 sisters devote themselves to the care of over 20,000 females who had yielded to temptation, or were rescued from impending danger.

8. The Christian religion has been the unvarying friend and advocate of the bondman. Before the dawn of Christianity, slavery was universal in civilized as well as in barbarous nations. The apostles were everywhere confronted by the children of oppression. Their first task was to mitigate the horrors and alleviate the miseries of human bondage. They cheered the slave by holding up to him the example of Christ, who voluntarily became a slave that we might enjoy the glorious liberty of children of God. The bondman has an equal participation with his master in the sacraments of the Church, and in the priceless consolation which religion affords. Slave-owners were admonished to be kind and humane to their slaves by being reminded with apostolic freedom that they and their servants had the same Master in heaven who had no respect of person. The ministers of the Catholic religion down the ages sought to lighten the burden and improve the condition of the slaves, as far as social prejudices would permit, till at length the chains fell from their feet. Human slavery has at last, thank God, melted away before the noonday sun of the gospel. No Christian country contains to-day a solitary slave. To paraphrase the words of a distinguished Irish jurist: As soon as the bondman puts his feet on a Christian land, he stands redeemed, regenerated, and disenthralled on the sacred soil of Christendom.

9. The Saviour of mankind never conferred a greater temporal boon on humanity than by ennobling and sanctifying manual labor, and by rescuing it from the stigma of degradation which had been branded upon it. Before Christ appeared among men, manual and even mechanical work was regarded as servile and degrading to the freeman of pagan Rome, and was consequently relegated to slaves. Christ is ushered into the world not amid the pomp and splendor of imperial majesty, but amid the environments of an humble child of toil. He is the reputed son of an artisan, and his early manhood is spent in a mechanic's shop. "Is not this the carpenter, the son of Mary?" The primeval curse attached to labor is obliterated by the toilsome life of Jesus Christ. Ever since he pursued his trade as a carpenter he has lightened the mechanic's tools and has shed a halo around the workshop.

If the professions of a general, a jurist, and a statesman are adorned, respectively, by the example of a Washington, a Taney, and a Burke, how much more is the calling of a workman ennobled by the example of Christ! What De Tocqueville said 60 years ago of the United States is true to-day, that with us every honest labor is honorable, thanks to the example and teaching of Jesus Christ.

To sum up: The Catholic Church has taught man the knowledge of God and of himself; she has brought comfort to his heart by instructing him to bear the ills of life with Christian philosophy. She has sanctified the marriage bond; she has proclaimed the sanctity and inviolability of human life from the moment that the body is animated by the spark of life till its extinction; she has founded asylums for the training of children of both sexes and for the support of the aged poor. She has established hospitals for the sick and homes for the redemption of fallen women. She has exerted her influence toward the mitigation and abolition of human slavery. She has been the unwavering friend of the sons of toil. These are some of the blessings which the Catholic Church has conferred on society.

I will not deny, on the contrary I am happy to avow, that the various Christian bodies outside the Catholic Church have been and are to-day zealous promoters of most of these works of Christian benevolence which I have enumerated. But will not our separated brethren have the candor to acknowledge that we had first possession of the field, that these beneficent movements have been inaugurated by us, and that the other Christian communities in their noble efforts for the moral and social regeneration of mankind, have in no small measure been stimulated by the example and emulation of the ancient Church?

Let us do all we can in our day and generation in the cause of humanity. Every man has a mission from God to help his fellow being. Though we differ in faith, thank God, there is one platform on which we stand united, and that is the platform of charity and benevolence. We cannot, indeed, like our divine Master, give sight to the blind, and hearing to the deaf, and speech to the dumb, and strength to the paralyzed limb, but we can work miracles of grace and mercy by relieving the distress of our suffering brethren. And never do we approach nearer to our heavenly Father than when we alleviate the sorrows of others. Never do we perform an act more God-like than when we bring sunshine to hearts that are dark and desolate; never are we more like unto God than when we cause the flower of joy and gladness to bloom in souls that were dry and barren before. "Religion," says the Apostle, "pure and undefiled before God and the Father, is this: to visit the fatherless and the widow in their tribulation, and to keep oneself unspotted from this world." Or to borrow the words of the pagan Cicero: *Homines ad Deos nulla re propius accedunt quam salutem hominibus dando;* ("There is no way by which men can approach nearer to the Gods than by contributing to the welfare of their fellow creatures.")

JAMES CARDINAL GIBBONS.

Catholic Church, Roman. By this name is designated the large body of Christians, united in doctrine and worship under the supreme jurisdiction of the pope, the bishop of Rome. (See PAPACY.) The members of this communion are wont rather to speak of it as the "Catholic Church," but admit the term "Roman" in the sense that "to be Roman is to be Catholic and to be Catholic is to be Roman." They hold that their Church alone possesses in its fulness the system of truths, laws, and practices for the worship of God which was instituted by Jesus Christ (q.v.). Hence a brief statement of Catholic teaching on the origin, nature, and properties of the Church of Christ will enable us to understand why the Roman Catholic Church demands that all men submit to her authority as a teacher, divinely appointed to make known with absolute certainty the conditions of salvation.

From the Four Gospels, considered as trustworthy historical documents, we learn that Jesus Christ was certainly a divine messenger to all mankind, and that therefore all men are bound to receive His message with implicit submission. The doctrine which He teaches may be an enforcement of truths which man might have learned, however imperfectly, by the use of his natural powers, or may include new truths which his natural powers would never have discovered. As Christ did not remain on earth to teach all men in person, He chose a band of apostles, whom He commissioned to preach to all nations the truths He had taught them, promising His assistance unto the end of the world, and imposing upon all men, under penalty of losing their souls, the obligation of receiving His doctrine. The presence of the Holy Spirit was to preserve the Apostles from error and keep them perfectly united in their teaching.

Besides the gift of infallibility (q.v.), He conferred on them jurisdiction over all believers, the right to govern with threefold power, legislative, judicial, and executive. Moreover, they were to sanctify men by certain religious rites, called sacraments (q.v.), and for this purpose received the gift of Holy Orders (q.v.). To Peter (see SAINT PETER), one of the Twelve Apostles, was granted a primacy, not merely of honor, but of jurisdiction. On him was Christ's Church to be built; he was to feed the entire flock, the lambs, and the sheep. By thus organizing a body to teach, govern, and sanctify men under the primacy of Saint Peter, Christ founded a religious society, supernatural in aims and means, and he chose for it the special name,

the Church. (See CHURCH, AN ORGANIZATION OF CHRISTIANS.) This society was to last even unto the day of judgment; its duty was to teach all men, wherefore the Apostles appointed their successors and transmitted to them the authority received from Christ. As the primacy of Saint Peter was the firm foundation, necessary to insure the unity and stability of the Church, it too was to last forever. The power he received was for him and his successors. There never should come a time when the doctrine of Christ would be lost through corruption.

Whence we gather that there exists to-day a religious society, empowered to teach with certainty all the truths of Christianity, and that it is a visible body, united in its government and religious teachings. The members of this society submit to its infallible teaching by profession of the faith, to its sacred ministry by the reception of baptism (q.v.) and to its ecclesiastical rule by obedience. If all men are obliged to enter this society, it is evident that Christ provided some signs, notes, or marks by which His Church can become known to all earnest inquirers, by which it can be distinguished from other associations. Christ intended that His Church should be known by Unity. It was to be one in faith, one in government, one in worship, and one in the charity uniting all its members. It was to be known by Holiness. The Church is holy in its Founder; in its aim to lead men to God; in its means of sanctification, in the heroic virtue of many members, and in the permanence of miracles among them. It was to be Catholic; that is, conspicuously diffused everywhere. Finally it was to be Apostolic. The governing and teaching body is the continuation of the Apostolic body to which Christ gave His mission and with which He promised to remain until the end of time. Whoever is not in communion with the successor of Saint Peter cannot possess union with the Apostolic body. The obligation of becoming a member of the Church is often expressed in these words: "Out of the Church there is no salvation." They do not mean that all who die out of the visible communion are lost. God does not inflict punishment but for a wilful fault, and those who without fault cannot see their obligation of joining the Church, are not to blame. If, however, anyone, knowing this obligation, refuses to comply with it, he puts himself out of the way of salvation. The same holds true for those who neglect to examine properly into a matter of so great importance.

Catholics hold that the marks of the true Church of Christ are found only in the Church in which the bishop of Rome holds the primacy. The bishops of this Church all over the world are the successors of the apostles, possessing the right to teach, to rule, and to sanctify. The gift of infallibility, that is, the right to declare that certain doctrines have been revealed by God is not personal to each bishop, but belongs only to the whole body of bishops, whether gathered in general council or not. The consent of the universal Church according to Christ's promise is a sure criterion of revelation. To the Bishop of Rome as the successor of Saint Peter belongs the primacy of jurisdiction over the whole Church, complete, supreme, ordinary, and immediate over each and all the churches of the world, over each and all the bishops and the faithful.

In this primacy is included the supreme authority as teacher of the Church, or the prerogative of papal infallibility. By virtue of a special supernatural assistance of the Holy Spirit promised to Saint Peter and his successors, the pope cannot err when, as supreme teacher of the universal Church, he defines a doctrine concerning faith or morals to be held by the whole body of the faithful. Only when these four conditions are fulfilled is the pope infallible: First, he must speak not in his private capacity, not merely in his official character, but as supreme teacher. Secondly, the matter defined must concern faith or morals. Thirdly, the judgment must be delivered with the manifest intention of commanding intellectual assent. Fourthly, the definition must be given to the whole body of the faithful. It is clear that infallibility has absolutely no connection with the pope's personal qualities and is entirely distinct from impeccability, or incapability of sinning. The extent of papal infallibility is the same as that of the Church's infallibility. It embraces all the truths that God has revealed as the object of faith, and extends to other truths and matters of faith without assurance of which it would be impossible or very difficult to preserve the deposit of revealed truth.

It follows from what we have hitherto said that whoever wishes to know Christ's doctrine must appeal to the living authority. The Church as teacher, that is, the bishops now living in union with the pope, can alone tell us what doctrines were revealed. This knowledge is not acquired from new revelations, but with the assistance of the Holy Ghost from various sources, chief among which is the preaching of the Gospel, by which the doctrines of Christ are handed down as a sacred heritage from age to age. Thus, even if nothing had ever been written, we should have to-day, uncorrupt and infallible, the means of preserving religious truth which Christ established, namely Tradition. However, it was natural that those who were commissioned to teach should also set down their teaching in writing. Hence we possess many documents and monuments from which we learn what the Church taught in past ages and what it now teaches; the truths revealed remain unchanged. Moreover, we learn from the Church that God Himself provided, by means of men, certain writings, containing revealed truth, and gave them to the Church for the instruction and direction of the faithful. (See BIBLE.) From it alone we learn what books have been so inspired and constitute Holy Scripture; the Church alone can authoritatively interpret these writings. Tradition, therefore, is prior to the Christian scriptures both in time and in thought. It is wider in its scope, for it embraces Scripture as an instrument by which tradition is handed down and on the other hand contains matters which are not in Scripture. First and principally, tradition teaches us the authoritative character of Scripture itself. Even were all the copies of Scripture destroyed, the living voice would still proclaim the entire Christian teaching. Catholics yield to none in their esteem of Holy Writ, as the inspired word of God, but they so esteem it because of what they learn concerning it from tradition. The chief sources from which this tradition is learned are the acts of councils, the writings of the

popes, of the Fathers of the Church, inscriptions, monuments, pictures, liturgies, rites, and pious customs, in a word, every way in which the Church is wont to profess her faith.

The Chief Doctrines of the Catholic Faith.— Catholics believe in one, true, living God, the Creator and Lord of heaven and earth and of all things visible and invisible, almighty, eternal, immense, and incomprehensible; infinite in will and intellect, and in all perfection, who, being one, singular, absolutely simple and unchangeable spiritual substance is to be regarded as distinct really and in essence from the world, infinitely happy in and from Himself and unspeakably elevated above all things that exist or can be conceived. He knows all things in the most perfect manner, by one all-embracing act of His intellect, from eternity to eternity ever the same. He knows His own being, all things that are possible, past, present, and future, and all things that are not and never have been nor will be, but which would be if some condition were fulfilled. He is all-wise, all-holy, all-just, true, faithful, and bountiful. Moreover, in God as there is one divine nature, so there are three divine persons, Father, Son, and Holy Ghost, really distinct from one another, perfectly equal to one another. Nevertheless there are not three Gods, but one God. The Father is unbegotten, the Son is begotten of the Father, and the Holy Ghost proceeds from the Father and the Son. (See TRINITY, DOCTRINE OF THE.) This one true God of His goodness and by His omnipotent power, not in order to increase His happiness, not to acquire perfection, but to manifest it by the good which He imparts to His creatures, in accordance with His absolutely free decree, at once from the beginning of time framed out of nothing as to the whole of their substance, two kinds of creatures, spiritual and material, the angels and the world, and then man, in whom spirit and matter were united. God preserves and governs by His providence all things that He has created.

To the angels He gave sanctifying grace and with it the power to merit eternal happiness by free service. Many of them rebelled and were cast into everlasting fire, the rest were confirmed in grace and admitted to the beatific vision of God. God "formed the body of the first man out of the slime of the earth." He created his soul immediately, as He creates the soul of every man; the soul is a spirit, endowed with intellect and free-will, and immortal. All men are descended from Adam (q.v.) and Eve. Like the angels, our first parents were also raised to a supernatural state by the infusion of sanctifying grace into their souls, being made adopted children of God, destined to the enjoyment of the beatific vision. This is the principle of supernatural life, whereby man can produce works that merit a heavenly reward. Moreover, God bestowed on man other preternatural gifts: great powers of mind and infused knowledge, complete control of the passions, immortality, and exemption from suffering and decay. This original justice our first parents lost by mortal sin, that is, by a grievous, wilful violation of God's law; in consequence of Adam's sin all of his descendants were deprived of those privileges, are conceived in original sin, and cannot of themselves enter the kingdom of heaven.

To atone adequately for the grievous insult to God and to repair the evil done to mankind, the second person of the Trinity became man. Jesus is true God and true man, one Divine Person subsisting in two natures, divine and human, not by the conversion of Divinity into flesh, but by the assumption of humanity unto God. He was born of the Virgin Mary, who was truly the Mother of God and remained a Virgin in conceiving and bearing her divine Son and ever after till the end of her life. By singular privilege of God through the merits of Christ, the Redeemer, the Blessed Virgin was preserved free from original sin (q.v.), that is, in the first moment of her conception, when her soul was created, it was endowed with sanctifying grace. By further privilege she was never guilty of any actual sin, mortal or venial. See MARY; IMMACULATE CONCEPTION.

Christ, the God-man, became our Redeemer, not by the mere effect of His preaching and example, but by His bloody death on the cross. He made Himself our mediator with His Father, offering atonement for the sins of all men. This satisfaction is not applied to those who have use of reason without their free employment of the means ordained by Christ. He merited for us the remission of sins, sanctifying grace, and all other graces conferred on man. After His death, He rose again on the third day, ascended into Heaven, where He sits at the right hand of the Father, whence He shall come with glory to judge the living and the dead, and of His kingdom there shall be no end. He founded a Church and confided to it the task of teaching His doctrines and applying to men's souls the means of sanctification. This Church is the guardian and interpreter of revelation; for though the existence of God can be known with certainty by the light of reason, it has pleased the Divine Wisdom to reveal many natural truths as well as all those that regard our supernatural life. This revelation is contained both in written books and in unwritten traditions. The books of the Old and New Testament, held by the Church to be sacred and canonical, were written by the inspiration of the Holy Ghost and have God as their author. In matters of faith and morals the true meaning of Scripture is that which is maintained by the Church. All interpretations at variance with the unanimous consent of the Fathers, when they speak as witnesses of tradition, are false and forbidden.

Whatever is presented to us by the Church as revealed truth must be accepted by the free assent of the intellect, not because of its intrinsic truth seen by the light of reason, but on the authority of God who has given the revelation, and who can neither be deceived nor deceive. This divine revelation has been made credible by external proofs, especially by miracles and prophecies; yet as faith is a supernatural virtue, the act of faith requires the assistance of divine grace, enlightening the intellect and strengthening the will and making our act supernatural. Without faith there is no justification, but as God wishes all men to be saved, all receive, either proximately or remotely, the grace to believe. Among revealed truths some are mysteries that cannot be demonstrated by human reason, but must be believed. The demonstrations of reason cannot contradict

revelation, hence any assertions of human science that are at variance with what the Church teaches to be revealed must be false.

As grace is necessary for the beginnings of faith, and even for the pious affection toward believing, so it is needed to make our good works deserving of a supernatural reward. Grace is needed even for the just to avoid sin. Final perseverance is a special privilege of dying in the state of grace. Apart from a special revelation, no one can know that he will receive this blessing. Without grace, however, it is possible to resist less urgent temptations and perform acts that have natural goodness; hence all works done before justification are not sins. According to Catholic doctrine, actual grace is a real influence exerted by the Holy Ghost upon the soul, but it does not destroy the free-will of man. A grace may be fully sufficient for a supernaturally good act, but if a man refuse to act with it, the grace will not be efficacious. God will not save us without our co-operation. See GRACE OF GOD.

Actual graces aid us to obtain habitual or sanctifying grace, that is, to be justified by the remission of original sin or of grievous actual sin. This sanctifying grace makes us like unto Christ, holy and supernaturally pleasing to God, and brings with it the infused virtues and the gifts of the Holy Ghost (q.v.). There are many grades of habitual grace; it may be increased by good works, and on the other hand may be entirely lost by mortal sin. God in His mercy offers to man supernatural happiness and makes this offer known by the preaching of His Church, which he accompanies by an interior stirring grace. When a man co-operates with this grace, he believes the truth with absolute certainty and is moved by the thought of God's love; he sees reasons to fear God's justice and throws himself on God's mercy, trusting in the merits of Christ; hence he conceives a love of God and a detestation of sin. Thus by the working of grace and the co-operation of man's free will, the way is prepared for justification; and, provided that man puts no obstacle, the Holy Ghost works this justification by infusing charity into his soul, thereby destroying sin. Thus purified, he enters on a virtuous life, hoping by the merits of Christ to enter heaven, but he has no absolute certainty of his salvation.

In the process of justification, the first grace cannot be merited at all; for no supernatural reward is due to natural acts. With the aid of grace both sinners and just can merit further actual grace, but only congruously and not with any strict right in justice. The just, that is, those in a state of grace, can merit final perseverance congruously, and, because of God's promises, can merit in justice the increase of habitual grace, eternal life, and increase of glory. By mortal sin, all merit is lost.

As a means of justification Christ has entrusted to His Church seven Sacraments (q.v.), or sensible rites, instituted by Him to effect in the soul the grace which they signify. When the necessary conditions are placed, the Sacrament works by its own efficacy and not through the piety of the minister nor of the recipient. The Sacraments are Baptism, Confirmation, Holy Eucharist, Penance, Extreme Unction, Holy Orders, and Matrimony. Baptism and Penance remit sin; the others cannot lawfully be received in mortal sin. Baptism, Confirmation, and Holy Orders can be received only once, because they imprint on the soul an ineffaceable mark, called the sacramental character. All the Sacraments, if properly received, give sanctifying grace or increase it, if already in the soul. Since the promulgation of the Gospel, justification cannot be obtained without Baptism of water, which blots out original sin and all actual sin. Infants who die without Baptism cannot enjoy the supernatural vision of God. In adults, when baptism of water cannot be received, pardon of sin can be obtained by the baptism of desire, which consists in a perfect love of God and a sorrow for sin, including, at least implicitly, the desire of the Sacrament. Remission of sin is also granted to all who suffer martyrdom for Christ. Sins committed after baptism are remitted by the Sacrament of Penance (q.v.), in which the sinner confesses with contrition all his mortal sins to the duly authorized priests of the Church, from whom he receives absolution. Sins are also remitted by perfect contrition, but the obligation of Divine Law requires that even then, if possible, they must be confessed. Penance pardons the guilt of sins confessed and repented of, infuses or increases sanctifying grace, remits eternal punishment, if it was due, secures actual graces to avoid sin in future, and may also remit, wholly or in part, the temporal punishment still to be undergone for sins the guilt of which has been pardoned. The whole punishment is not always remitted with the fault; for the remaining debt satisfaction is made to God by sufferings patiently borne or voluntarily inflicted. For this purpose also the Church has the power of granting indulgences, which are not a remission of sin, much less a permission to commit sin, but the remission of the whole or part of the temporal punishment which may be due for sins, after the guilt has been pardoned. See INDULGENCE.

In the Holy Eucharist there is really and substantially present the Body and Blood, Soul and Divinity of our Lord Jesus Christ, under the appearances of bread and wine. By the words of the priest at the consecration, there is effected a conversion of the whole substance of the bread into the Body and of the whole substance of the wine into the Blood, which conversion is called transubstantiation (q.v.). By force of the words, the Body is under the species of the bread and the Blood under the species of the wine, but in virtue of the natural connection and concomitance by which the parts of Christ are linked together, He exists whole and entire under each species and every part of the species. In the Mass (q.v.) there is offered to God a true, proper, and propitiatory sacrifice for the living and the dead. To offer up this sacrifice, Christ instituted a visible and external priesthood and the Sacrament of Holy Orders (q.v.); the minister of this Sacrament must be a bishop, who has received the fulness of the sacred ministry. The various orders constitute the Hierarchy. Priests cannot ordain or confirm. Other orders are the diaconate, subdiaconate, and the minor orders (Acolyte, Exorcist, Lector, and Ostiarius). Before the minor orders, the tonsure is conferred as a sign of enrolment among the clergy, who are separated from the rest of the faithful, called the laity. The right to exercise the sacred functions within appointed limits is

called jurisdiction; it is required for the lawful performance of all functions and for the validity of some The Roman pontiffs have, by Divine institution, universal jurisdiction. The other bishops have power to govern the dioceses to which they have been assigned by the pope.

Marriage between Christians was raised by Christ to the dignity of a sacrament. Its essence lies in the contract freely made between man and wife; the grace conferred is first an increase of sanctity, and, secondly, actual grace to fulfill the duties of the married state. The bond of Christian marriage after consummation is absolutely indissoluble; it is also exclusive, no man can have several wives, no woman several husbands, at the same time. Those who, with the aid of God's grace, fulfil the obligations of virginity or celibacy live in a state more holy and better than the state of matrimony. From the fact that Christian matrimony is a Sacrament, it follows that it has been intrusted to the Church and is subject to the laws of the Church, not to those of the State; hence the Church has the power of assigning conditions necessary for the validity or lawfulness of the contract between those who have been baptized. See MARRIAGE.

The means of sanctification are given to men to enable them to live and die in the state of sanctifying grace. At the hour of death each soul is judged by Christ, and if in mortal sin, is condemned to hell to be punished by eternal torments, varying in intensity according to the degree of guilt. Those who die free from all sin, mortal and venial, and from all the temporal punishment for sin, are admitted at once to life everlasting, to perfect beatitude in the vision of God. The saints and angels in heaven offer up prayers for men, and it is good and useful to invoke their intercession that we may obtain favors from God through Jesus Christ, who is our sole Redeemer and Saviour. Catholics honor and worship the saints and angels, and especially the Blessed Virgin Mary, because God loves and honors them, and because of their own personal sanctity; not, however, with the supreme worship that belongs only to God. Because of their special connection with holy persons, honor is also given to relics of the saints, to images and paintings of Christ and His saints. If men die in venial sin, or temporal punishment be still due, their souls are detained in Purgatory (q.v.) until expiation is made. In this state they can no longer merit for themselves, but can be assisted by the prayers and good works of the faithful and particularly by the holy sacrifice of the Mass. The Church has the power to apply indulgences for their relief. In addition to the particular judgment, immediately after death, there will be a general judgment at the end of the world. The body will rise from the grave reunited to the soul, and share for eternity either happiness in heaven or punishment in hell.

The chief duties of Christian life are expressed in the Ten Commandments of God and the commandments of the Church. Many laws have been imposed by the Church on particular classes or for special purposes; all Catholics, however, are bound, under pain of mortal sin, to hear Mass and rest from servile work on Sundays and Holydays of obligation, to fast and to abstain from certain food on the days appointed, to confess all mortal sins at least once a year, and to receive the Holy Eucharist during the Easter time.

A Catholic must believe all the truths God has revealed and teaches through His Church. Denial of one such would mean either the denial of God's veracity or of the Church's infallibility. But it is not necessary that he should know explicitly more than the principal truths; all others are included in his acceptance of the Church as a divine teacher, alone capable of declaring what truths are contained in the *deposit of faith* handed down from the apostles. The definition of a dogma by the Church brings no change in doctrine; for no truth once taught as of faith is ever given up nor can any point be added which was not contained, at least implicitly, in the original teaching. However, the Church's infallibility is not limited merely to revealed doctrines; she can also speak infallibly on matters necessary to safeguard revealed teaching. Belief in such decisions is called ecclesiastical faith. Outside the domain of divine or ecclesiastical faith, there are many subjects of pious belief among Catholics. Some of these may perhaps belong to the deposit of faith, but they are not yet authoritatively proposed. Others depend on human testimony, and are accepted with that degree of certitude which the testimony warrants.

In the expression of revealed truths and in the defense of faith from the charge of conflict with demonstrated truths of science and philosophy, the Church makes use of terms derived from the philosophy current among its subjects. Thus it has come about that the dogmas are expressed in the terms of scholastic philosophy and officially in the Latin language. As its doctrines can be taught in any language, so, too, the expression of them may be harmonized with whatever is found to be true in any system of philosophy.

In the worship, liturgies, discipline, and practices of the Church, some regulations may be of divine origin, others are of ecclesiastical origin, and still others arise from the voluntary piety of individuals. Besides the ordinary obligations of Christian life, she invites those of her children who feel the call from God to bind themselves by vow to His service. The principal vows are those taken to observe the evangelical counsels of poverty, chastity, and obedience. Those who have thus bound themselves in approved congregations or religious orders are called *religious.* (See ORDERS, RELIGIOUS.) As a matter of discipline all those in Sacred Orders in the Latin portion of the Church are bound to observe celibacy. In the Greek portion, to-day, no priest can marry, but married men may receive Holy Orders, except episcopal consecration.

External Organization of the Church.— Supreme jurisdiction, as we have seen, resides in the Pope; the bishops are the rulers of dioceses, which are subdivided into parishes or missions under a parish priest or rector, assisted by curates. The dioceses are united into provinces, over each of which is an archbishop or metropolitan, the other bishops being called his suffragans. The archbishop convokes provincial synods, hears certain appeals from the episcopal court, watches over the observance of ecclesiastical law in some particulars, and, under certain circumstances, appoints an administrator when a

suffragan dies. The patriarchate is to-day only an honorary rank. The Pope is represented in some countries by apostolic delegates, to whom are referred appeals from the lower courts and through whom the Pope sends his communications. In some countries there are apostolic nuncios, who deal directly with the various governments that have their representatives at Rome.

The Pope is assisted immediately by the Sacred College of Cardinals and by the Sacred Congregations. The College of Cardinals, when complete, contains 70 members: 6 Cardinal Bishops of the Suburban Sees, 50 Cardinal Priests, and 14 Cardinal Deacons. The Sacred Congregations, 21 in number, are committees of Cardinals to whom special affairs are entrusted. They were arranged, almost as at present, by Pope Sixtus V. The Cardinals alone cast votes for the final decisions, but they are assisted by secretaries and consultors. The Pope himself acts as prefect of some congregations (the Inquisition, the Apostolic Visitation, and the Consistorial). A Cardinal presides over each of the others. The acts of all congregations are submitted to the Pope for his approval. These acts, unless promulgated in a solemn manner as the acts of the Sovereign Pontiff himself, are subject to change; though not infallible, they must be received by the faithful with an internal assent, such as is due to religious authority and obeyed as laws of the Church. The more important congregations are: the Holy Roman Inquisition (the supreme tribunal to judge of heresy and crimes allied with heresy), the Consistorial (which selects the matters that are presented and sanctioned by the College of Cardinals assembled in the Papal Consistories), the Apostolic Visitations, Bishops and Regulars, the Council of De Propaganda Fide (which cares for missionary countries), Sacred Rites, the Index (which prohibits the reading of books condemned as contrary to faith or good morals), Indulgences and Relics, and the Congregation of Studies.

The Church and Civil Authority.— The Church was established by Christ as a perfect, independent religious society. Its authority depends on God's ordinances alone; wherefore it has always denied any right on the part of the state to interfere in its internal affairs. In Catholic countries, the Church claims immunity for its officials from the authority of civil tribunals; in past ages this immunity was often absolutely necessary for their just protection. Sometimes the Pope makes a Concordat with temporal rulers: that is, a treaty whereby, in consideration of certain promises of these rulers, the Pope abstains from urging certain of his rights. To exercise the prerogatives which we have described, the Pope, his Cardinals, and other officials must be exempt from the jurisdiction of any civil tribunals. Practically this cannot be secured without the Temporal Power (q.v.), or better, the Temporal Independence of the Sovereign Pontiff. It is not enough for the Pope to be free, he must be known to be free: suspicion of being under the influence of a sovereign would be fatal to his influence. This independence he possessed for more than 15 centuries; it was assured by the recognition of his sovereign authority in the states of the Church. Since the usurpation of these states by the Italian government, the Popes, Pius IX., Leo XIII., and Pius X., have not ceased to proclaim: (1) that this seizure was an act of injustice; (2) that the Pope no longer possesses the freedom, security, and independence demanded by his dignity, his rights, and for the proper exercise of his authority; and (3) that the Holy See must insist on these facts and look forward to some efficient remedy for the injustice and indignity of present conditions. To deal rightly with Catholics of all nations, the Pope must be extra-national. As the seat of our general government, the District of Columbia, is independent of all the States, so the seat of the general government of the Church should be independent of all the countries of the earth.

History.—The history of the Roman Catholic Church may be divided into three great epochs: (1) Christian Antiquity, embracing the first seven centuries, during which Christian civilization was chiefly Greek and Roman. (2) The Middle Ages, from the 8th century to the 16th, characterized by the Church's action among the various peoples of north and central Europe, who were molded into organized nations by her influence. (3) The Modern Age, from the rise of Protestantism to the present day, during which the Germanic nations separated from the Church and attached themselves to various sects, and the Church has had to struggle against the modern, infidel spirit in science and government.

The first epoch contains two periods. First comes an era of persecution, during the struggle with paganism, which was terminated by the edict of Milan (313); then, an era of development in definitions of dogma against the attacks of heresy. The second epoch embraces four periods: I. The conversion of the barbarians. II. The development of the Western Empire and the Church's struggle to maintain her independence (800–1073). III. The supremacy of the Church maintained (1073–1300). IV. Attacks on the Church's supremacy, from Boniface VIII. to Protestantism.

During the third epoch three periods may be distinguished: I. The period of religious warfare, ending with the Peace of Westphalia, 1648. II. From 1648 to the French Revolution: the era of established Churches. III. Down to the present day: Neo-paganism in science and life, the age of unrestrained freedom to accept or deny the truths of religion.

Even while the Church was undergoing cruel persecution, she was also developing her discipline and defending her doctrines against the pagans and heretics. From the first three centuries have come down to us the valuable works of Ignatius, Polycarp, Justin, Clement of Alexandria, Origen, Tertullian, Cyprian, and many others. The mightier struggle with heresy, and her marvelous growth after she emerged from the catacombs, gave renown to Athanasius, Basil, the Gregories in the East and West, Chrysostom, the Cyrils, Hilary, Ambrose, Jerome, Augustine, Leo, and a host of other Christian writers, of whose works the modern world knows very little. The growth of monasticism (q.v.) is one of the glories of this age. Monks and nuns consecrated their lives to God's service by prayer and study and labor, thus preserving the ancient civilization from utter destruction by the barbarians, and preparing for the Church the means of converting these barbarians and transforming them into the

civilized communities of Europe. The intimate union which existed between Church and State gave rise to the Holy Roman Empire (q.v.) and to the great body of laws by which their mutual relations were regulated. Frequent attempts were made later to subject the Church to the Empire. They were frustrated by the Popes, and especially by Gregory VII., after whom comes the glorious period of vigorous life and eminent learning. Among the orders that were then founded we may mention the Carthusians, Cistercians, Franciscans, Dominicans, and Servites, fruitful in numerous saints and scholars. The Church boasts of Saint Anselm, Peter Lombard, Albertus Magnus, Saint Thomas Aquinas, Saint Bonaventure, Duns Scotus, Saint Bernard, and others. It was also the age of Crusades (q.v.) for the recovery of Palestine. The 14th and 15th centuries are noted for the revival of interest in pagan literature, the sad exile of the Popes at Avignon, and frequent movements to effect a much-needed reformation of morals. In this work, many rejected the divine authority of the Church and were cast out as heretics; they are generally regarded as forerunners of Martin Luther (q.v.), who succeeded in separating whole sections of Germany from the Church, and became the occasion for the counter reformation that was effected by men like Francis de Sales, Ignatius Loyola, and Peter Canisius during the 16th century, and especially by the great work of the Council of Trent (1545–63). At this same period, millions of pagans were brought into the Church by the heroic labors of her missionaries, notably in South America, India, Ethiopia, and Japan. England, under Henry VIII. and Elizabeth, renounced the supremacy of the Pope, made a state religion of its own, and by the penal laws almost annihilated the Catholics. France remained Catholic, but, becoming infected with Jansenism and Gallicanism (qq.v.), and later with atheism and socialism, brought about the utter disorganization of Continental society. In the reconstitution of the shattered nations, Napoleon (q.v.) thought to make the Papacy his tool, and thus ruin the Church; but he failed, and the 19th century witnessed the gradual revival of the Church in almost all European countries, and its stupendous growth in the United States and other English-speaking countries. Catholic emancipation in England (1829), the Tractarian movement (see TRACTARIANISM) in the Established Church, that resulted in so many converts to Rome, and the restoration of the Catholic hierarchy (1850), have given Catholics prominence in English life. In France, though the people are loyally Catholic, the government is engaged in controversy with the Church and in the attempt to control Catholic education. When the French garrison was withdrawn from Rome in 1870, the Papal states and the city of Rome were annexed and added to the Italian kingdom. For the past 34 years the Pope has never left the Vatican Palace. Shorn of their earthly kingdom, Pope Pius IX. (q.v.) and Leo XIII. (q.v.) witnessed the attempt of Bismarck (q.v.), in Germany, to subject the Catholic Church to the State; but they witnessed also the failure of the attempt and the repeal of almost all the iniquitous laws. Persecution served only to unite all Catholics and revealed to them the power of united action. In the United States the Church has grown from 244,500 in 1820 to 12,000,000 or 13,000,000 in 1900. This great increase has been due mainly to immigration from Europe and Canada. Irish, Germans, French Canadians, Italians, Poles, and Bohemians have come in large numbers. Meeting with no official opposition, the Church has prospered and is regarded even by many non-Catholics as a strong power for the preservation of the republic from the new social dangers that threaten the United States as well as the whole civilized world.

The activity of the Church in the mission field was almost destroyed by the wholesale confiscations of the French Revolution. As soon as order had been established in Europe, the missions revived, and, especially since Gregory XVI., have spread to every land of the world. Dioceses are mapped out and bishops appointed as soon as the circumstances warrant. The reorganization of the Congregation *De Propaganda Fide* by Pius IX., with separate sections for the Latin and the Oriental Churches, has been of great advantage. Colleges, institutes, and special religious congregations have been founded in various cities of Europe for work in the foreign missions. The Association for the Propagation of the Faith is the largest of the societies among the laity for the collection of funds. Missions are also conducted with success in the Oriental Churches in communion with the Holy See. These Churches hold the same doctrines as the Latin Church, but have special rites, discipline, and liturgical language. There are four chief groups: I. The Greek, subdivided into Greek proper, Melchite, Slav (which is Ruthenian and Bulgarian), and Rumanian. II. The Syrian, subdivided into Syrian proper, Syro-Chaldean (which also included the Malabar) and Maronite. III. The Coptic, which is Egyptian and Abyssinian or Ethiopian. IV. The Armenian. Pope Leo XIII. was much interested in these eastern churches, and had the joy of receiving many converts into communion. See MISSIONS, ROMAN CATHOLIC.

Statistics.— The number of Catholics throughout the world, according to the latest computations given by H. A. Krose, S.J., in the 'Stimmen aus Maria Laach,' July-August 1903 (republished in the 'Catholic World,' New York, February 1904), is 264,505,922. They are distributed as follows: Asia, 11,513,276; Africa, 3,004,563; Australia and Oceanica, 979,943; America, 71,350,879; Europe, 177,657,261. These numbers, according to the compiler, represent less than the whole number of Catholics, on account of the impossibility of obtaining official reports. He believes that there are at least 270 millions. For America the following numbers are given:

British North America, 2,301,693; United States, 10,976,757; Central America, 16,150,946; West Indies, 4,964,481; South America, 36,957,002; total, 71,350,879. In the Philippine Islands there are 6,599,998 Catholics. The number of Catholics assigned to the United States is regarded by the ecclesiastical authorities as too low; it is variously estimated at thirteen or fourteen millions. The following table gives the estimated number in the chief countries of Europe:

Austria Hungary, 35,570,870; Belgium, 6,660,000; Denmark, 5,373; France, 38,180,000; German Empire, 20,321,441; Great Britain, 2,-

000,000; Greece 34,710· Ireland 3,500,000· Italy, 32,300,000; Holland, 1,790,161; Norway, 1,969; Portugal, 5,277,000; Russia and Finland, 11,326,804; Sweden, 1,390; Switzerland, 1,383,135; Spain, 18,200,000; Turkey and Crete, 300,000.

Bibliography.— Wetzer and Welte, 'Kirchenlexikon' (1882–1901); Shea, 'History of the Catholic Church in the United States' (1886–92); Werner, 'Orbis Terrarum Catholicus' (1890); Hunter, 'Outlines of Dogmatic Theology' (1895); Coppens, 'Systematic Study of the Catholic Religion' (1903); Wilhelm and Scannell, 'Manual of Catholic Theology'; Wiseman, 'Lectures on the Catholic Church'; Schanz, 'A Christian Apology'; Humphrey, 'Urbis et Orbis'; Guggenheimer, 'General History of the Christian Era'; Pastor, 'History of the Popes from the Close of the Middle Ages'; Janssen, 'History of the German People'; Parsons, 'Studies in Church History'; Alzog, 'Universal Church History'; 'La Gerarchia Cattolica'; Hoffman's Catholic Directory and Clergy List.' See EDUCATION — ROMAN CATHOLIC; CANADA — CATHOLIC EDUCATION; ORDERS, RELIGIOUS; ROMAN CATHOLIC CHURCH IN CANADA; RELIGIOUS SECTS.

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Catholic Colleges in Europe, American. (1) The Pontifical College of the United States at Rome, Italy. This institution was founded by Pius IX., and was formally opened by him 8 Dec. 1859. In 1884 Leo XIII. ranked it among pontifical colleges, with the privileges thereto appertaining. Ecclesiastical students only are admitted; students pursuing the courses in the humanities, philosophy, and theology at the Urban College of the Propaganda. In 1904 the number of students was reported as 97. (2) The American College at Louvain, Belgium. This was founded in 1857 by several American bishops. The rules and constitutions were confirmed by Leo XIII. in 1895. The objects of the institution are to educate for the priesthood American students sent by their bishops to Louvain, and to prepare students from Belgium and adjacent countries for important missions in dioceses of America. Only those students are admitted who have finished a complete course in philosophy at a Catholic college. There is a three years' course in theology at the University of Louvain, followed by higher studies leading to the various degrees in theology and canon law.

Catholic Copts, those native Egyptian Christians, about 5,000 in number, who acknowledge the authority of the Pope. One of their priests was made a vicar apostolic and bishop *in partibus* (residence at Cairo) in 1855; in 1895 Leo XIII. established over them a hierarchy, the head of which has the designation "Patriarch of Alexandria of the Copts."

Catholic Creditor, in Scots law, a creditor whose debt is secured by a lien or charge on more than one subject belonging to the debtor.

Catholic Education. See EDUCATION, ROMAN CATHOLIC; CANADA — CATHOLIC EDUCATION.

Catholic Emancipation Act, an act of the British Parliament passed in the 10th year of the reign of George IV., 13 April 1829, by which the Catholics of Ireland were relieved of civil disabilities still persisting there after the more odious and oppressive provisions of the penal laws enacted in 1691, in violation of the stipulations of the Treaty of Limerick, had been gradually done away. For 50 years after 1691 those laws were enforced vigorously; from that time to the era of emancipation there was a gradual relaxation. The design of those penal laws was the extermination of the Catholic religion in the island and the administration of the government purely for the behoof of the "Protestant interest" and the "English interest." A Catholic was not permitted to be a landowner, nor even to hold land on lease, save for a brief term; the son of a Catholic could, by making profession of the Protestant religion, come into possession of his father's property, allowing to his parent an annuity; if a Catholic owned a horse, whatever its value, any Protestant might legally seize it on paying to the owner $25; no Catholic priest could lawfully exercise his ministry in Ireland save under severe restrictions, and monks and friars were regarded as felons and punished as such; no Catholic could be a barrister, nor a schoolmaster; Catholics were ineligible to the Parliament of Ireland, or even as electors: they were not permitted to be freemen of boroughs. When the act of union of the kingdom of Ireland with that of Great Britain was passed William Pitt gave solemn assurance to the Catholics of Ireland that the last of their disabilities would be forthwith removed, and bills to that effect were brought into Parliament; but Pitt, giving way before the insane bigotry of King George III., did not press the measure and went out of office. The Catholics continued to demand their enfranchisement and emancipation, and their appeals were heard in the British Parliament; but it was seen that the hope of redress of grievances was vain unless a show of force was made, or a popular agitation set on foot. Daniel O'Connell, already a highly successful counselor-at-law, though not a barrister, owing to his disability as a Catholic, took the leadership of the Catholics of Ireland, and from 1824 till the act of emancipation was passed, Ireland was the scene of an unprecedented popular agitation, never equaled in any country till the agitation for the repeal of the union with Great Britain was set on foot immediately after the grant of Catholic emancipation. The British cabinet was alarmed by the outburst of popular enthusiasm in Ireland, and the House of Commons in 1825 passed a relief bill for Ireland, but the lords rejected it. A second relief bill, two years later, failed in the House of Commons. But the following year, 1828, the House, although the cabinet (Wellington's) was adverse, passed that second bill. This gave the cabinet and even the king (George IV.) pause, and it was confessed that really something might or must be done; but the agitation must cease. The reply of the Irish Catholics was to nominate O'Connell, despite his legal disability, for membership in the Parliament and to elect him triumphantly. He was a member of Parliament-elect, but he would not take the oath whereby he must accept the king's supremacy in religion. It was the king and the cabinet that had to retreat now. The bill for Catholic emancipation was brought into the House of Commons on 5 March 1829, and passed the first reading by a

majority of 188 in a House of 508 members; on the second reading the majority was 180; and on the final vote it was 178 in a House of 462. Even in the lords the measure was passed by a good majority, and the bill received the king's assent. The rights and privileges accorded to the Catholics of Ireland by this act were: that they were not to be required to take the oath of supremacy; that they became admissible to all offices in corporations and to enjoyment of all municipal rights. But no Catholic could be regent or lord chancellor, either of Great Britain or of Ireland; and they were incapable of holding offices connected with the Established Church or the universities. In all other respects the Catholics were to stand on an equal footing with Protestants.

Catholic Epistles, those letters in the New Testament which are addressed to the faithful in general, not to particular churches, as is that to the Philippians, that to the Ephesians, etc.; nor to individuals, as are the epistles of Paul to Timothy, Titus, etc. The catholic or general epistles are those of James, 1 and 2 Peter, 1 John, and the epistle of Jude. These same epistles are also styled Canonical, signifying, according to Calmet, that they contain excellent rules (*canones*) of faith and morals.

Catholic Indian Missions, Bureau of, an organization of the Roman Catholic Church, established in 1874 by the archbishop of Baltimore in behalf of Catholic prelates having Indian missions within their respective dioceses, in order to represent before the Government the interests of these prelates in all matters appertaining to Indian affairs. By decree of the 3d Plenary Council of Baltimore it was recognized as an institution of the Church and placed under the charge of a committee of seven prelates. This committee was dissolved in 1894; and the bureau, as then constituted, was superseded by a new corporation. The chief work of the bureau is the establishment of schools among the Indian tribes, and the obtaining from governmental and other sources of funds for their maintenance.

Catholic Knights of America, a fraternal organization established in Kentucky in 1877. It was chartered in 1880. Its object is to unite fraternally all acceptable Roman Catholics of every profession, business, and occupation; to give all possible moral and material aid in its power to members of the organization, by holding instructive and scientific lectures, by encouraging each other in business, and by assisting each other to obtain employment, and to establish and maintain a benefit fund for the benefit of the families of the members. The benefit fund is distributed according to well-established insurance rules. The age limits for admission are from 18 to 45. At first men only could become members; but since about 1901, women have been allowed admission on the same conditions as men, except the age limits for women are from 18 to 40. The executive power is vested in the Supreme Council (National) with headquarters in St. Louis, Mo.; the State councils, and the officers of the local branches. In 1903 there were 500 branches in the United States, with a membership of 30,000 and a reserve fund of $600,000. Since its organization to 1903, there has been paid to beneficiaries $13,000,000; but the material aid has been slight compared with the spiritual, moral, and intellectual benefit the organization has effected. This is the pioneer Roman Catholic fraternal organization in the United States.

Catholic Majesty, a title given by Pope Alexander VI. to the kings of Spain, in memory of the complete expulsion of the Moors from Spain in 1491 by Ferdinand of Aragon. But even before that time several Spanish kings are said to have borne this title.

Catholic Missionary Union, The, an organization of the Roman Catholic Church established "to procure the services of clergymen and laymen of the Roman Catholic Church to teach and preach as missionaries of their faith in the United States and in furtherance of religious opinion"; "to lease, take, hold, and purchase places, buildings and lands for such teaching and preaching"; to provide for the maintenance of the workers; to publish and distribute books, pamphlets, and other reading matter in connection with these efforts; and to aid archbishops, bishops and other church authorities in the United States to establish and conduct missions within their respective jurisdictions. Its practical activity takes the form of the collection of funds to enable bishops of the various dioceses to reserve diocesan priests for missions to non-Catholics within their various jurisdictions and to maintain such missionaries in their work. The Apostolic Mission House, on the grounds of the Catholic University, Washington, D. C., is the training-school for diocesan missionaries.

Catholic Summer School of America, a school for higher education established by the Roman Catholics at Plattsburg, N. Y., on Lake Champlain. It was organized in 1892, and met at various places before the present site was decided upon. In 1893 the regents of the University of the State of New York granted a charter by which this school became a legal corporation, and was classified in the system of public instruction devoted to university extension. By this charter certain advantages are acquired by summer-school students who wish to prepare for the regents' or State's examinations. The object of the school is to increase facilities for those who wish to pursue lines of study in various departments of knowledge. Opportunities for instruction are provided by lectures from eminent specialists. Courses are given in anthropology, history, literature, ethics, science, and religion. The school is beautifully located, and though not far from the principal summer hotel on Lake Champlain, has its own cottage accommodations, a club or casino for social reunions, its lecture halls, and local book store. The place is an ideal summer resort and attracts many friends of education, both Roman Catholic and Protestant.

Another summer school, the Columbian Catholic Summer School, assembled at Madison, Wis., in July 1898, with lecturers from Washington, D. C., and other centres of educational work. In 1901 it removed to St. Paul, Minn., and adopted the name of the American Catholic Chautauqua.

Catholic Total Abstinence Union of America, a confederation of all the Catholic total abstinence organizations in this country. It believes that the virtue of temperance is a religious virtue, to be cultivated by religious

methods. The membership, amounting in the year 1900 to 80,000, includes women's societies and juvenile organizations, as well as men's societies. While the union urges men to become total abstainers, it does not hold that drink is an evil in itself, or that the use of it is wrong, but that the use of it is for many the proximate occasion of sin; and that by such persons drink should be abandoned altogether. It does not assert that all goodness and virtue are in total abstinence, but it does hold that total abstinence is a powerful preventive of social disorder and sin. The office of the general secretary of the union is in the house of the Paulist Fathers in New York. The union publishes for circulation numerous pamphlets on the subject of total abstinence.

Catholic University of America, an educational institution founded for the purpose of affording an opportunity for pursuing higher studies in the most important branches under the guidance of the Roman Catholic Church. According to its constitutions, the courses of study must be of the highest possible grade; and the constitutions further declare that "the authorities of the university shall take care to confer with the directors of Catholic colleges and seminaries in our country so that all may labor unitedly to advance the education of Catholic youth. The clause in the constitutions concerning the 'higher studies' has been so interpreted that to-day the university is a purely post-graduate institution. Whether the bishops of the United States, who assembled in the second plenary council of Baltimore, contemplated this or not is open to question. It is certain, however, that in October 1866, they earnestly expressed the wish that there should be in the United States a university in which all branches of science, both sacred and profane, should be taught." The precise scope of the university or the time for its foundation were not then decided upon. The idea of a university of the highest class was formulated by the Right Reverend John Spalding, bishop of Peoria, on all appropriate occasions, and the effect of his discourses on public opinion had much to do with the contentment with which American Catholics received the announcement that the prelates of the United States had resolved, in November 1884, in the third plenary council, that a university should be founded. The offer of Miss Gwendoline Caldwell, now the Marquise Monstiers de Merinville, of $300,000 was accepted. This gift was made for the purpose "of founding a grand theological seminary for the higher education of the clergy of the United States, said seminary to form the basis of a future Catholic university."

It was thought that Washington, not because it is the capital of the country, but because of the great educational advantages offered by its libraries, laboratories, etc., would be the logical site, and although other places were suggested, Washington, after mature consideration, was chosen in 1885 by the board of trustees. This decision was formally approved by the hierarchy on 7 Sept. 1887. The Middleton estate, near the Soldiers' Home — one of the most beautiful parts of the District of Columbia — was bought in the same year. In the following year, the Right Reverend John J. Keane, bishop of Richmond, now archbishop of Dubuque, was elected the first rector. In a letter, dated 20 Oct. 1885, the Holy Father, Leo XIII., had warmly approved of the project. Bishop Keane was sent to Rome, bearing all the important documents concerning the university, and, on 21 April it was incorporated under the laws of the District of Columbia. The corner-stone of Caldwell Hall — the school of sacred sciences — was laid on 4 May 1888, in the presence of the President of the United States, representatives of the foreign embassies and legations, and a large group of distinguished persons from all parts of the country. On 13 Nov. 1889, the School of Sacred Sciences — that department of theology and cognate studies for students who had made preparatory studies in the seminaries — was opened with solemn ceremonies. In all the epochs that marked the growth of the university, the interest, sympathy, zeal, and good judgment of its chancellor, Cardinal Gibbons, archbishop of Baltimore, were evident.

So far, while the basis for an ecclesiastical establishment existed, no provision had been made for laymen or for the founding of departments of learning not strictly included in the educational processes of priests. The Catholic hierarchy and the laity were united in desiring that some further provision should be made. the Reverend James McMahon, afterward as Monsignor McMahon, an honorary member of the papal household, a priest of the archdiocese of New York, offered to the university a gift of $400,000. This donation was accepted by the board of trustees in 1891, and the corner-stone of McMahon Hall was laid on 27 April 1892. On 1 Oct. 1895, McMahon Hall was dedicated, and the schools of philosophy and social sciences, including law, were opened. On 24 March 1896, the school of the technological sciences was founded. The directors of the theological school, Caldwell Hall, saw the difficulties which a graduate student in a country where priests are so much in demand for active work would meet. The whole field of theology is so wide, and the time allotted comparatively so short, being two years for the licentiate and two more for the doctorate, that the student is expected to concentrate his work upon one major branch of theology. Minor branches may be taken by him in the school of theology, or one minor in the school of philosophy. The school of sacred sciences is divided into four groups — the biblical, the dogmatic, the moral, the historical. The faculty of philosophy, organized in 1895, contains within it the schools of philosophy, philosophy proper, based on the teaching of St. Thomas Aquinas; experimental psychology, etc.; letters, literature, philology, etc.; physical, biological, and social sciences. The degrees offered in the school of sacred sciences are the baccalaureate, the licentiate, the doctorate — S.T.B., S.T.L., S.T.D. The degrees in philosophy are Ph.M. and Ph.D. The faculty of law contains the school of law and jurisprudence, the school of social sciences having been transferred to the faculty of philosophy on 8 Feb. 1898. Under the board of the institution of technology is the school of the technological sciences.

In September 1896, Bishop Keane, the rector, was called to Rome, to receive later an appointment to the archbishopric of Dubuque. He was succeeded by the Very Reverend Dr. Conaty on 22 Nov. 1896. Having served the allotted term of six years, Bishop Conaty, during his term

titular bishop of Samos, was appointed bishop of Los Angeles, and in April 1903, the Right Reverend Monsignor Dennis J. O'Connell, who in the fall of 1902 had been appointed rector of the university, assumed his duties.

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Catholic Winter School, a school holding session in the winter months at New Orleans. The first session was held 16 February to 14 March 1896, and was very successful. New Orleans was chosen for its seat as one of the most catholic centres of American education, with Tulane University, the Howard Memorial Library, a fine system of public schools, and the record of French Catholic spiritual and intellectual activity extending through nearly two centuries. At the school popular education is naturally connected with religion; the sessions are opened with pontifical high mass in St. Louis Cathedral.

Catholic Women's Benevolent Legion, a fraternal and beneficial society, incorporated under the laws of the State of New York, 23 Aug. 1895. Age limits, 17 and 55. Branches have been established in nearly every State in the United States; membership, in 1903, 30,000. They have paid out to beneficiaries several thousand dollars, but keep well invested a safe reserve fund. Special efforts have been made to establish social and literary societies, and to promote the spiritual and temporal welfare of their members.

Catholic Young Men's National Union, an association for furtherance of Roman Catholic unity and the moral advancement of its members. The means relied on for accomplishing its object are: practical fulfillment by the individual members of the obligations imposed by their religion; fraternal union of all associations that aim in any way at the spiritual, intellectual, and moral improvement of Catholic young men, and the privilege assured to each member of being received as a guest by any society in the Union, or as a member by transfer. The third plenary council of the Roman Catholic Church of the United States, held at Baltimore, thus expresses approval of the union in its pastoral letter: "In order to acknowledge the great amount of good that the C. Y. M. N. U. has already accomplished . . . we cordially bless their aims and endeavors, and we recommend the union to all Roman Catholic young men."

Catiline (LUCIUS SERGIUS CATILINA), Roman conspirator: b. about 108 B.C.; d. Pistoia 5 Jan. 62 B.C. Of patrician birth, but poor, he attached himself to the cause of Sulla, had some share in his success, and still more in his proscriptions. Murder, rapine, and conflagration were the first deeds and pleasures of his youth. He appears to have served in the army with reputation. Sallust, who has written the history of his conspiracy, describes him as having a constitution that could support hunger, cold, fatigue, and want of sleep, to an incredible extent; with a spirit bold, cunning, fruitful in resources; lusting after the wealth of others, prodigal of his own; a man of fiery passions, but limited judgment. Such was his art, that, while poisoning the minds of the Roman youth, he gained the friendship and esteem of the severe Catullus. Equally well qualified to deceive the good, to intimidate the weak, and to infuse his own boldness into his associates, he evaded two accusations brought against him by Clodius for criminal intercourse with a vestal, and for monstrous extortions, of which he had been guilty while proconsul in Africa. A confederacy having been formed of many young men of high birth and daring character, who saw no other means of extricating themselves from their enormous debts than by obtaining the highest offices of the state, Catiline was placed at their head. This eminence he owed chiefly to his connection with the old soldiers of Sulla, by means of whom he kept in awe the towns near Rome, and even Rome itself. At the same time he numbered among his adherents not only the worst and lowest of the populace, but also many of the patricians and men of consular rank. Everything favored the audacious scheme. Pompey was pursuing the victories which Lucullus had prepared for him; and the latter was but a feeble supporter of the patriots in the senate, who wished him, but in vain, to put himself at their head. Crassus, who had delivered Italy from the gladiators, was now striving after power and riches, and countenanced the growing influence of Catiline as a means of his own aggrandizement. Cæsar, who was laboring to revive the party of Marius, spared Catiline, and perhaps even encouraged him. Only two Romans remained determined to uphold their falling country — Cato and Cicero; the latter of whom alone possessed the qualifications necessary for the task. The conspirators were now planning the elevation of Catiline and one of his accomplices to the consulship, by which they hoped to obtain possession of the public treasures and the property of the citizens under various pretexts, and especially by means of proscription. Cicero had the courage to stand candidate for the consulship: neither insults nor threats, nor even riots and attempts to assassinate him, deterred him from his purpose; and being supported by the rich citizens, he gained his election, 65 B.C. All that the party of Catiline could accomplish was the election of Caius Antonius, one of their accomplices, as colleague of Cicero. This failure, however, did not deprive Catiline of the hope of gaining the consulship the following year. For this purpose he revived the kind of terrorism by which he had laid the foundation of his power. Meanwhile, he had lost some of the most important members of his conspiracy. Antony had been prevailed upon or compelled by Cicero to remain neutral. Cæsar and Crassus had resolved to do the same. Piso had been killed in Spain. Italy, however, was destitute of troops. The veterans of Sulla only waited the signal to take up arms. The signal was now given by Catiline. The centurion Manlius appeared among them, and formed a camp in Etruria. Cicero was on the watch: a fortunate accident disclosed to him the counsels of the conspirators. One of them, Curius, was on intimate terms with a woman of doubtful reputation, Fulvia by name, and had acquainted her with their plans. Through this woman Cicero learned that L. Vargunteius, a senator, and C. Cornelius, a knight, had undertaken to assassinate him at his house. On the day which they had fixed for the execution of their plan, they found the doors barred and guarded. Still Cicero delayed to make public the circumstances of a conspiracy, the progress and resources of which

he wished first to ascertain. He contented himself with warning his fellow citizens, in general terms, of the impending danger. But when the insurrection of Manlius was made known, he obtained from the senate the decree, only promulgated on occasions of the utmost importance, that "the consuls should take care that the republic receive no detriment." It was exceedingly difficult to seize the person of one who had soldiers at his command both in and out of Rome; still more difficult would it be to prove his guilt before judges who were accomplices with him, or at least were willing to make use of his plans to serve their own interest. Cicero had to choose between two evils — a revolution within the city, or a civil war: he preferred the latter. Catiline had the boldness to take his seat in the senate, known as he was to be the enemy of the Roman state. Cicero then rose and delivered that bold oration against him, beginning, *Quousque tandem abutère, Catilina, patientia nostra?* ("How long then, Catiline, wilt thou abuse our patience?") Assuming a confidence he did not possess, he attempted a reply, but his words were instantly drowned by the cries of "Parricide!" and "Traitor!" which rose on all hands. Now fully conscious that his plans were discovered, he rushed from the assembly with threats and curses on his lips, and left Rome at dead of night. The conspirators who remained, Lentulus Sura, Cethegus, and other infamous senators, engaged to head the insurrection in Rome as soon as Catiline appeared at the gates. According to Cicero and Sallust, it was the intention of the conspirators to set the city on fire, and massacre the inhabitants. Lentulus, Cethegus, and the other conspirators, in the meanwhile, were carrying on their criminal plots. They applied to the ambassadors of the Allobroges to transfer the war to the frontiers of Italy itself. These, however, revealed the plot, and their disclosures led to others still more important. The correspondence of the conspirators with their leader was intercepted. As the circumstances of the case did not allow of a minute observance of forms in the proceedings against the conspirators, the laws relating thereto were disregarded, as had been done in former instances of less pressing danger. Cæsar spoke against immediate execution, but Cicero and Cato prevailed. Five of the conspirators were put to death. Caius Antonius was then appointed to march against Catiline, but on the pretext of ill health, gave the command to his lieutenant, Petreius. He succeeded in enclosing Catiline, who, seeing no way of escape, resolved to die sword in hand. His followers imitated his example. The battle was fought with bitter desperation. The insurgents all fell on the spot which their leader had assigned them, and Catiline at their head. See Sallust, 'Bellum Catilinarium'; Cicero, 'Orationes in Catilinam'; Rose, 'History of Catiline's Conspiracy' (1813).

Catinat, Nicholas de, Marshal of France: b. Paris 1637; d. Saint Gratien 1712. He quitted the profession of the law for that of arms, and attracted the notice of Louis XIV. at the storming of Lille in 1667, and was promoted. By a number of splendid deeds he gained the esteem and friendship of the great Condé, particularly by his conduct at the battle of Senef. He was sent as lieutenant-general against the Duke of Savoy, gained the battles of Staffardo, 18 Aug. 1690, and of Marsaglia, 4 Oct. 1693, occupied Savoy and part of Piedmont, and was made marshal in 1693. In the conquered countries his humanity and mildness often led him to spare the vanquished, contrary to the express commands of Louvois. In Flanders he displayed the same activity, and took Ath in 1697. In 1701 he received the command of the army of Italy against Prince Eugene; but was straitened by the orders of his court, and was destitute of money and provisions, while Eugene was allowed to act with full liberty. On 6 July he was defeated at Carpi. Equally unfortunate was the battle of Chiari, where Villeroi had the chief command. It was here, while rallying his troops after an unsuccessful charge, that he replied to an officer who represented to him that death was inevitable in such an encounter. "True, death is before us, but shame behind." In spite of his representations the French court would not believe the disasters in Savoy to be owing to the perfidy of the Duke of Savoy, and Catinat was disgraced. He was a true philosopher, religious without austerity, a courtier without intrigue, disinterested and generous when in favor, and cheerful in disgrace. From his unalterable calmness and consideration his soldiers called him "le Père la Pensée."

Catineau-Laroche, Pierre Marie Sebastien, pē-ār mā-rē sā-bäs-tī-ŏn̄ kā-tē-nō lā-rōsh, French lexicographer: b. Saint-Brieuc 25 March 1772; d. 22 May 1828. He studied at Poitiers, and emigrated to St. Domingo, where he published a journal 'L'ami de la paix et de l'union.' He was sentenced to death for the opinions which he advocated, but, by the timely assistance of the agents of the king of France, succeeded in escaping to Cape Haytien (then called Cape Français), where he alone of 17 of his countrymen was saved from the subsequent massacre in that city. He now visited the United States and England, and on his return to Paris, in 1797, prepared several dictionaries. His printing office having been destroyed by fire, the government employed him in various public capacities. Once more he visited the United States, and on his return, in 1819, he was commissioned to go to Guiana, and study the climate and resources of that province. His notes on that country appeared in 1822.

Catkin. See AMENT.

Cat'lin, George, American traveler and artist: b. Wilkesbarre, Pa., 26 June 1796; d. Jersey City, N. J., 23 Dec. 1872. After practising as a lawyer for two years he set up at Philadelphia as a portrait painter, and in 1832 commenced special studies of the American Indians, residing many years among them both in North and South America. In 1840 he went to Europe, and subsequently introduced three parties of American Indians to European courts. His finely illustrated works are: 'Manners, Customs, and Condition of the North American Indians' (1857); 'North American Portfolio' (1844); 'Eight Years' Travel in Europe' (1848); 'Last Rambles Among the Indians,' etc. (1868). His 500 portraits from life of American Indians are now in the National Museum at Washington, D. C.

Catlin, Henry Guy, American mining engineer: b. Burlington, Vt., 21 July 1843. He studied at the University of Vermont, and

served during the Civil War in the 12th Vermont Volunteers. Besides various contributions to the magazines, descriptive of western life, he has written 'Yellow Pine Basin' (1898).

Catlin, Louise Ensign, American writer: b. Lockport, N. Y., 9 May 1861. She was educated at Smith College, and was married to Frederick Ward Catlin in 1882. She has published 'Marjory and Her Neighbors.'

Catlinite, a dull red indurated clay. It occurs in Pipestone County, Minn., as a layer about 18 inches thick in quartzite. It has been extensively manufactured by the Sioux Indians into pipes and various ornamental objects.

Cat'nip, Cat'nep, or **Cat-mint,** a hardy perennial herb (*Nepeta cataria*) of the natural order *Labiatæ*. It is a native of the Orient and Europe, and has become distributed in most temperate regions of the globe. It is very common in America in the neighborhood of dwellings. Cats are especially fond of it, rubbing themselves upon it and eating it with evident relish. Like other members of its order, it contains a fragrant volatile oil, for which it is sometimes used in cooking. It grows about two feet tall, bears heart-shaped, velvety, whitish-green leaves, and dense whorls of numerous small, purplish or rosy-white flowers. Catnip is sometimes planted in herbaceous borders to soften the tinting, at the same time heightening the effect with its erect stems. In medicine, catnip tea enjoys great popularity with the laity. It is brewed hot and is very useful in attempts to avert "colds." The heat, volatile oil, and accompanying care that the patient takes are all self-conservative.

Cato, Dionysius, the reputed author of the small collection of moral apophthegms known as 'Catonis Disticha de Moribus ad Filium.' Nothing is known of him; but the work, which is apparently in large part a genuine classic, had a high reputation in the Middle Ages.

Cato, Marcus Porcius, THE CENSOR, surnamed PRISCUS, also SAPIENS ("the wise"), and MAJOR ("the elder"), Roman statesman and general: b. Tusculum 234 B.C.; d. 149 B.C. He inherited from his father, a plebeian, a small estate in the territory of the Sabines, which he cultivated with his own hands. He was a youth at the time of Hannibal's invasion of Italy, and served his first campaign, at the age of 17, under Fabius Maximus, when he besieged Capua. Five years after he fought under the same commander at the siege of Tarentum. After the capture of this city he became acquainted with the Pythagorean, Nearchus, who initiated him into the sublime doctrines of his philosophy, with which, in practice, he was already conversant. After the war was ended Cato returned to his farm. As he was versed in the laws, and a fluent speaker, he went at daybreak to the neighboring towns, and acted as counselor and advocate to those who applied to him. Valerius Flaccus, a noble and powerful Roman, who had an estate in the vicinity, observed the talents and virtue of the youth, conceived an affection for him, and persuaded him to remove to Rome, where he promised to assist him with his influence and patronage. A few rich and high-born families then stood at the head of the republic. Cato was poor and unknown; but his eloquence, which some compared to that of Demosthenes, and the integrity and strength of his character, soon drew public attention to him. At the age of 30 he went as military tribune to Sicily. In the following year he was quæstor, at which period there began between him and Scipio a rivalry and hatred which lasted till death. Cato, who had returned to Rome, accused Scipio of extravagance; and, although his rival was acquitted, this zeal in the cause of the public gave Cato a great influence over the people. Five years after, having been already ædile, he was chosen prætor, and obtained the province of Sardinia. His strict moderation, integrity, and love of justice, were here still more strongly displayed than in Rome. On this island he formed an acquaintance with the poet Ennius, of whom he learned Greek, and whom he took with him to Rome on his return. He was made consul 192 B.C., having his friend Valerius Flaccus for colleague. He opposed with all his power the abolition of the Oppian law, passed in the pressing times of the second Punic war, forbidding the Roman women to wear more than half an ounce of gold, to dress in garments of various colors, or to wear other ornaments; but he was obliged to yield to the eloquence of the tribune Valerius, and still more potent female importunities. Soon after, he set out for Spain, which was in a state of rebellion. His first act was to send back to Rome the supplies provided for the army, declaring that the war ought to support the soldiers. He gained several victories with a newly raised army, reduced the province to submission, and returned to Italy, where the honor of a triumph was granted to him. He afterward put himself under the command of the Consul Manius Acilius, to fight against Antiochus, and to carry on the war in Thessaly. By a bold march he made himself master of the Callidromus, one of the highest peaks of the mountain pass of Thermopylæ, and thus decided the issue of the battle. He brought the intelligence of this victory to Rome, 189 B.C. Five years after, in spite of a powerful faction opposed to him, he obtained the most honorable, and at the same time the most feared, of all the magistracies of Rome, the censorship. He had not canvassed for the office, but had only expressed his willingness to fill it. In compliance with his wishes Valerius Flaccus was chosen his colleague, as the only person qualified to assist him in correcting the public disorders, and restoring the ancient purity of morals. He fulfilled this trust with inflexible rigor; and though his measures brought him some obloquy and opposition, they met, in the end, with the highest applause; and when he resigned his office, it was resolved to erect a statue to him with an honorable inscription. He appears to have been quite indifferent to the honor; and when, before this, some one expressed his wonder that no statue had been erected to him, he answered, "I would rather have it asked why no image has been erected to Cato than why one has." Still he was not void of self-complacency. "Is he a Cato, then?" he was accustomed to say, when he would excuse the errors of another. Cato's political life was a continued warfare. He was continually accusing, and was himself accused with animosity, but was always acquitted. His last public commission was an embassy to Carthage to settle the dispute between the Carthagin-

ians and King Massinissa. It is said that this journey was the original cause of the destruction of Carthage; for Cato was so astonished at the rapid recovery of this city from its losses, that he ever after ended every speech of his with the well-known words, *Præterea censeo, Carthaginem esse delendam* ("I am also of opinion that Carthage must be destroyed"). He died a year after his return. Cato, who was so frugal of the public revenues, was not indifferent to riches. He was rigorously severe toward his slaves, and considered them quite in the light of property. He made every exertion to promote and improve agriculture. He was twice married, and had a son by each of his wives. His conduct as a husband and a father was equally exemplary. He composed a multitude of works, of which the only one extant is 'De Re Rustica.' Those of which the loss is most to be regretted are his orations, which Cicero mentions in terms of the highest encomium, and his history of the origin of the Roman people, which is frequently quoted by the old historians.

Ca'to, Marcus Porcius, called (to distinguish him from the censor, his great grandfather) CATO OF UTICA, Roman patriot: b. Rome 95 B.C.; d. Utica, North Africa, 46 B.C. He formed an intimacy with the Stoic Antipater of Tyre, and maintained through life the principles of the Stoic philosophy. His first appearance in public was against the tribunes of the people, who wished to pull down a basilica erected by the censor, Cato, which was in their way. On this occasion he displayed that powerful eloquence which afterward rendered him so formidable, and won the cause. He served his first campaign as a volunteer in the war against Spartacus, and highly distinguished himself. He served as military tribune in Macedonia in 67 B.C. When his term expired he went to Asia, and brought back the Stoic Athenodorus with him to Rome. He was made quæstor in 65 B.C., and executed his difficult trust with the strictest integrity, while he had the spirit to prosecute the public officers for their acts of extortion and violence. His conduct gained him the admiration and love of the Romans, so that, on the last day of his quæstorship, he was escorted to his house by the whole assembly of the people. The fame of his virtue spread far and wide. In the games of Flora the dancing-girls were not allowed to lay aside their garments as long as Cato was present. The troubles of the state did not permit him to remain in seclusion. The example of Sulla in usurping supreme power was followed by many ambitious men, whose mutual dissensions were all that saved the tottering constitution from immediate ruin. Crassus hoped to purchase the sovereignty with his gold; Pompey expected that it would be voluntarily conferred upon him; and Cæsar united himself to both and made use of the wealth of the one and the reputation of the other to attain his own objects. By keeping aloof from all parties Cato served the commonwealth with sagacity and courage; but he often injured the cause which he was trying to benefit by the inflexibility of his character. In 63 B.C. he was chosen tribune of the people. About this time the conspiracy of Catiline broke out. Cato supported Cicero, then consul, with all his power, first gave him publicly the name of "father of his country," and urged, in a fine speech preserved by Sallust, the rigorous punishment of the traitors. He opposed the proposition of Metellus Nepos to recall Pompey from Asia, and give him the command against Catiline, and very nearly lost his life in a riot excited against him on this account by his colleague and Cæsar. After the return of Pompey he frustrated many of his ambitious plans, and first predicted the consequences of his union with Crassus and Cæsar. The triumvirate, in order to remove him to a distance, had him sent to Cyprus, of which he took possession on behalf of Rome (58–57). Compelled to obey, he executed his commission with so much address that he enriched the treasury with a larger sum than had ever been deposited in it by any private man. In the meantime he continued his opposition to the triumvirate. Endeavoring to prevent the passage of the Tribonian law, for investing the triumvirs with extraordinary powers, he was drawn into tumults, and even personal conflict. Being made prætor in 54 B.C., he carried into execution a law against bribery that displeased all parties. After the death of Crassus the civil commotions increased, and Cato, as the only means of preventing greater evils, proposed that Pompey should be made sole consul, contrary to the constitution, which proposition was adopted. The year following, 51 B.C., Cato lost the consulship by refusing to employ bribery to procure a majority. In 49 B.C. the civil war broke out. Cato, then proprætor in Sicily, on the arrival of Curio with three of Cæsar's legions, departed for the camp of Pompey at Dyrrachium. He had always hoped to prevent the war by negotiation; and when it broke out he put on mourning in token of his grief. Pompey, having been victorious at Dyrrachium, left Cato behind to guard the military chest and magazine, while he pushed after his rival. For this reason Cato was not present at the battle of Pharsalia, after which he sailed with his troops to Cyrene, Africa. Here he learned that Pompey's father-in-law, Scipio Metellus, had gone to Juba, king of Mauritania, where Varus had collected a considerable force. Cato immediately set off to join him, and after undergoing every hardship, reached Utica, where the two armies effected a junction, 47 B.C. The soldiers wished him to be their general, but he gave this office to Scipio, and took command in Utica, while Scipio and Labienus marched out against Cæsar. Cato had advised them to protract the war, but they ventured an engagement, in which they were defeated, and Africa submitted to the victor. Cato had at first determined to defend himself to the last, with the senators in the place; but abandoned this plan, and despairing of the commonwealth, and unwilling to live under the despotism of Cæsar, resolved to die. On the evening before the day which he had fixed upon for executing his resolution, he took a tranquil meal, and discussed various philosophical subjects. He then retired to his chamber and read the 'Phædo' of Plato. Anticipating his intentions, his friends had taken away his sword. He sent for it, and in spite of the tears and entreaties of his friends persisted in his purpose, advised those present to submit to Cæsar, and dismissed all but the philosophers Demetrius and Apollonius, whom he asked if they knew any way by which he could continue to live without being false to his principles.

Weeping silently, they left him. He then received his sword joyfully, again read 'Phædo,' made calm inquiries for departing friends, slept awhile, and when left alone stabbed himself. His people rushed in, and finding him in a swoon bound up his wounds; but, on coming to himself, he tore off the bandages and expired. The Uticans buried him honorably, and erected a statue to him. Cæsar, when he heard the news of his death, exclaimed, "I grudge thee thy death, since thou hast grudged me the honor of sparing thy life."

Cato, the title of two noted 18th century plays: (1) A blank verse tragedy by Joseph Addison in five acts. It was first represented in 1713. The scene is laid in a hall of the governor's palace at Utica. The subject is Cato's last desperate struggle against Cæsar, and his determination to die rather than survive his country's freedom. 'Cato' owed its extraordinary success to the deadly hatred that raged between the Whigs and Tories at the time: the Whigs cheered when an actor mentioned the word "liberty"; and the Tories, resenting the implied innuendo, cheered louder than they. To the Whigs Marlborough was a Cato, to the Tories he was a Cæsar. Every poet of the time wrote verses in honor of 'Cato,' the best being Pope's prologue; and it was translated into French, German, and Italian. (2) A tragedy by Metastasio, 1727. The author follows closely the historic accounts of Cato's relations with Cæsar, and the details have more probability than those of Addison. He shows a decided superiority to Addison in making Cæsar the principal figure next to Cato, and placing them constantly in contrast with each other.

Cato Street Conspiracy, or **Thistlewood Conspiracy,** in English history, a plot formed in 1820 to murder the foreign secretary, Lord Castlereagh and other cabinet ministers, and to form a provisional government. The leader of the conspirators was Arthur Thistlewood. The plot was discovered and several of the conspirators captured, on 23 February, when they had assembled in a stable on Cato Street and were preparing to carry out their intentions. Thistlewood, who escaped, was arrested the next day. After a trial in which they were defended by John Adolphus, Thistlewood and four others were executed, and five were transported.

Ca'ton, John Dean, American lawyer and author: b. Monroe, N. Y., 1812; d. 1895. From 1855 to 1864 he was chief justice of Illinois. He published 'A Summer in Norway' (1875); 'The Last of the Illinois and a Sketch of the Pottawatonnies' (1876); 'The Antelope and Deer of America' (1877).

Catop'trics, that branch of optics which explains the properties of incident and reflected light, and particularly that which is reflected from mirrors or polished surfaces. The whole doctrine of catoptrics rests on the principle that the angle of incidence is equal to the angle of reflection and in the same plane.

Catop'tromancy, a species of divination practised by the Greeks, in which a mirror was let down by a cord into a fountain in the temple of Ceres, in Achaia, into which sick persons looked. If the observer's face appeared in it sickly or ghastly the omen was considered unfavorable, and the sick person would not recover; but if, on the other hand, it appeared fresh and healthy, the omen was considered favorable.

Catorce, kä-tōr'thā, or ka-tôr'sā, Mexico, a mining town of San Luis Potosi, which received its name, signifying 14, from a gang of robbers, formerly a constant menace to its inhabitants. It contains valuable silver mines, now pretty well worked out. The ore is mixed with sulphur, and requires treatment by a high degree of heat. When the French invaded Mexico, a mint was started here, and worked until 1867. The amount coined was about $52,000,000. The population is variable, ranging from 10,000 to 18,000, according to the state of mining.

Catostom'idæ, a family of fishes of the order *Plectospondyli* (q.v.), or, in a more limited sense, of the *Eventognathi.* They have the first four vertebræ coalesced and partly converted into a chain of bones reaching from the swim-bladder to the internal ear; the lower pharyngeal bones elongated and falcate, and bearing a row of numerous comb-like teeth; the jaws toothless and formed in part by the maxillary bone; the mouth usually small with thick protractile lips; the form more or less elongate and rounded or slightly compressed; and the fins soft, rayed with no adipose (rayless) dorsal fin. An extensive family of fresh-water fishes, chiefly of North America, where 12 or 14 genera and more than 60 species occur; in addition to which a very few are found in eastern Asia. Although abundant almost everywhere in the United States, none of the species have more than a local value as food fishes. To the *Catostomidæ* belong the suckers, buffalo-fishes, horse-fishes, certain so-called mullets, etc. (qq.v.).

Cat'rail (also known as the PICTS' WORK or PICTS' WORK DITCH), the name applied to the remains of a large earthwork in Scotland, about 50 miles in length, which, beginning at Torwoodlee Hill, near the junction of the Gala Water with the Tweed, runs with a semicircular sweep southward through the counties of Selkirk and Roxburgh to a point under Peel Fell, in the Cheviots. The earthwork consisted of a deep ditch, with a rampart on each side, and varied in breadth from 20 to 26 feet. Various causes have resulted in the destruction of the ramparts in many places. The Catrail has led to much speculation.

Cats, Jacob, yä'kōb käts, Dutch poet: b. Brouwershaven, Zealand, 10 Nov. 1577; d. Zorgvliet, near Scheveningen, 12 Sept. 1660. He studied at Leyden, Orleans, and Paris. In 1627 and 1631 he was ambassador to England, and in 1636 grand pensioner of Holland. His poetry is unimaginative, and didactic, but has been extremely popular with the Dutch middle class by whom he is frequently affectionately alluded to as "Father Cats." His works consist of allegories, according to the taste of his times, poems on the different ages and situations of life, idyls, etc. Among the most noted are 'Het Houwelick' (Marriage) (1625); 'Sinnen Minnebeelden' (1618); 'Trouringh' (1637).

Cat's-eye, the name given to several hard semi-transparent stones used as gems, which, when cut in a certain way, show a line of light giving what is called a *chatoyant* effect. The true cat's-eye is a chrysoberyl of a greenish color, found in Ceylon and Brazil. The line of

light shown when the stone is cut *en cabochon* is due to the structure of the crystal, or to included impurities. The common cat's-eye, of little value, is a crystalline quartz sometimes containing fibres of asbestos, which, cut across the fibres, gives a *chatoyant* effect. It is found in Bavaria. Tiger-eye (q.v.) also shows the chatoyancy of the cat's-eye. Beautiful tourmaline cat's-eyes, rivaling the oriental stones, have recently been found in California. Stones exhibiting the cat's-eye ray have been cut from various other minerals, including beryl, corundum, fibrous hornblende, bronzite, and hypersthene.

Cats'kill, N. Y., village and county-seat of Greene County, 30 miles southeast of Albany, on the west side of the Hudson River and on the West Shore and the Catskill Mountain R.R.'s; also connected with the New York Central by a ferry crossing the Hudson. It is a noted mountain summer resort and has a courthouse, opera house, free academy, two national banks, several public schools, weekly newspapers, manufactories, and hotels. Pop. (1900) 5,484.

Catskill Group, a name given to a great thickness of red, brown, green, and gray conglomerates, sandstones, and shales of which the Catskill Mountains are composed. Being well exposed by numerous cliffs and gorges, these deposits were carefully studied by the New York Geological Survey some 50 years ago. The rocks were believed to constitute a series, having a definite place in the classification of the Palæozoic rocks worked out by the Survey, and were given the name Catskill. Subsequent investigation has shown that the Catskill is not even to be called a group. It is simply a succession of shoal-water deposits of Upper Devonian age, that were laid down along one shore of an interior sea, while normal marine sediments, now represented by limestones, were being laid down elsewhere. Thus it happens that the Lower Catskill, of the Catskill Mountains, is represented elsewhere by limestones of the Hamilton stage, the Middle Catskill by the Portage, and the Upper Catskill by the Chemung. In the Catskill Mountains the so-called Catskill series is 4,500 feet thick; and where thickest, at Mauch Chunk, Pa., it is 7,500 feet thick. Farther south the rocks thin out and disappear altogether in Virginia. Though having no standing as a rock group, the Catskill is of interest from its many resemblances to the Old Red Sandstone of England, made famous by Hugh Miller, and is of economic importance from containing some beds of excellent flags, quarried at numerous openings in Ulster, Greene, and Delaware counties, N. Y., and sold as Hudson River bluestone. See DEVONIAN; OLD RED SANDSTONE.

Catskill Mountains. In the eastern part of the State of New York, facing the valley of the Hudson River, appears a group of mountains so singular in their formation, so exceptional in point of beauty of outline, that they have attracted universal attention since the day when the astonished crew of the Half Moon first saw their peaks rise above the primeval forests that lined the shores of the great river.

That part of the earth's surface now called New York is very old; so old, indeed, that it is difficult to guess at the age of the first rocky islands that appeared above the ancient seas. The Highlands of the Hudson and the plateau of the Adirondacks may be among the oldest lands in the world. The interior of the State remained under the inland sea, that spread from the Hudson valley westward to the present Great Lakes for perhaps millions of years after these primal islands appeared. In time the surf, the rain, and the ice tore down these islands and spread the resulting sand, gravel, and mud far and wide over the sea floor, and in the course of ages filled up this inland sea so that it ultimately became dry land. This fact makes the interior of the State one of the most remarkable places in the world, for here the history of the earth is spread open as a page wherein can be easily read the progress of world-building. Fortunately the floor of the old sea has much of it remained undisturbed so that many successive pages can be seen in their original positions.

Men of science have divided the age of the earth's crust into four great "times," each an unknown number of millions of years long. The first is Eozoic Time, the pale, dim dawn-time before there was any life or before the first faint traces of the lowest life appeared. The second is Palæozoic Time, and this grand period is divided for convenience into three shorter "ages." The third is Mesozoic Time, also divided into three "ages"; and the last, in which we live, is Cenozoic Time. Looking far back to the beginning of the third age of Palæozoic Time we can imagine the southern and western border of the State a vast stretch of sandy bars awash or in the sea, vaster wastes of soft mud and oozy shoals of limey remains of marine life, great pebbly beaches and shingly bays and countless islands in the great muddy sea. The waters swarmed with fish, for the age of fishes was already old, and on the land already appeared the land plants, for the age of land plants was just beginning. To the south were vast tropic, fern-clad swamps that were to be turned later into the coal fields of Pennsylvania. To the north the far older parts of the State were perhaps already dry land or rapidly becoming so. Then, later, we do not know when, this vast track of half sea, half land, slowly turned to sandstones, shales, and slates. Still later, under the tremendous pressure caused by the gradual shrinkage of the earth's crust, it was pushed up into the air, and it now forms the great flat dome or plateau that extends along the southern edge of the State next the Pennsylvania line. Out of this interior upland, that slopes gently to the north, was thrust toward the east a narrow tongue of pale-blue shale or slate-like stone and gray and red sandstones that intruded upon the valley of the Hudson. The disturbance caused by the shrinkage of the earth was far more violent in the eastern part of the State than in the western part, as plainly shown by the present distorted positions of the water-formed rocks in the Hudson valley, and this tongue of newer stone was lifted high in the air. The upward pressure lifted the entire mass into the air perhaps without breaking it and leaving it slightly tilted downward or inclined to the west, a vast, wonderful plateau, a giant-wall of rocks unique among the stony annals of the world. To-day we look upon it in mingled wonder at such a page of world-history and admiration at the handiwork of the rain that has made of such a story-book so great a gal-

BIG INDIAN VALLEY

ENTRANCE TO THE PLAATERSKILL CLOVE.

lery of pictures. We call this open page of the earth's story "the Catskills."

The beauty of every landscape depends upon its port of view. A hill that seems commonplace from one side may have unusual grace and refinement when seen from another side. Herein lies the charm of the Catskills — they are fine from every side. Thrust forward into the comparatively level Hudson valley, they seem to stand quite alone between the Laurentian and far older mountains of the Highlands and the Adirondacks. The traveler approaching by boat or by rail on the eastern shore and from the south is surprised soon after leaving Poughkeepsie by sudden, blue elusive glimpses of dim forms, half cloudlike, upon the northern horizon. Then, for more than an hour, by rail, the mountains pass in grand procession, presenting at every mile new charms of peak and slope. In clear weather and, particularly in winter, the banded or stratified appearance of the eastern face of the range is readily seen, showing plainly that the Catskills are rocks laid down in the ancient sea. Moreover, those mile-long bands mark the ends of the stratifications, sharply broken off and making a remarkable wall or face, unlike the usual slope of other mountains, like the Adirondacks or the Highlands. The views from the West Shore Railroad are equally interesting, and are nearer and more neighborly. The approach from the north, by rail or boat, is also interesting, though it shows the grand panorama of peaks in a reversed order.

There are three routes by which the more settled or summer resort portion of the Catskills may be reached. Beginning at Rondout or Kingston, for the two towns are one, the Ulster & Delaware Railroad enters the Catskills by their southern gateway. Kingston can be reached by the West Shore Railroad or by boat, or by the New York Central Railroad at Rhinebeck and then by ferry to Kingston. On leaving Kingston the first foot hills soon appear, and at every mile the scenery becomes more wild, rough, and interesting. The mountains close in upon the narrow valley up which the road climbs through Stony Clove. This wonderfully beautiful entrance to the uplands of the Catskills is worthy of attention, because the outlines of the mountains on every side plainly show that the once comparatively level and uniform plateau has been carved out by erosion into its present form. It seems clear that these knife-like edges, steep slopes, valleys and peaks were carved out by the rain. They are "weathered" into the shapes they now exhibit. This will be still more evident in other places. After passing the Clove the road enters a comparatively level tableland and ends abruptly and with a grand surprise upon the sheer edge of the once giant table.

Another shorter, and in some respects more sensational, approach is by way of the town of Catskill. This point may be reached by the New York Central Railroad by taking the ferry at Greendale station, or by boat, or by the West Shore Railroad. At this point begins the short and most interesting ride over the Otis Inclined road, which runs west 10 miles from Catskill and, then by means of a cable, climbs directly up the face of the eastern wall. This is one of the most remarkable rides in the world, because the view, as the car ascends, gives at every turn of the wheels a wider and wider view over the Hudson valley and, far away to the east, to the Berkshire Hills. The view from the top is already famous, having been often described, and is worth all the trouble of a long journey to see.

A third route, and the most instructive of all, is from Catskill by road up the Kaaterskill valley or Clove. The first 10 miles to the entrance to the valley is through a rolling, farming country, and should be carefully examined, because the winding road passes over three of the great pages of the earth's story-book. At Catskill, and for the first two or three miles, the road is over very ancient slates, mementos of the old Silurian sea that once covered the State. Chance exposures of these slates show that they have been very much distorted and bent out of their original horizontal positions by the terrific squeezing together caused by the shrinkage of the earth's crust. Leaving these slates we pass over ridges of younger limestones and then still younger slates and sandstones, and wherever exposed to view along the road all appear to be tilted up or having a slight slope to the west. All the time there are glimpses of the higher and far younger rocks of the Catskills, till at last the great banded gray wall rears itself before us as if to bar the way. Then follows the four-mile ride up the steep, winding road that leads to Haines Falls and the mountain top.

The most striking things about this wonderful valley road are the views it gives of the stony skeleton of the mountains. At the very gateway of the Clove we can see a sheer wall of the rock from its smooth water-worn base in the brawling brook up to the topmost shelves of rock that seem ready to fall into the deep valley below. Here is the open page of the Catskill story. We can see the bands of rock laid down through the ages. Some are hard and, resisting the weather, stand out in overhanging sheets. Others are softer and are hollowed out, and appear to be crumbling into thin, slaty fragments. Nowhere in the eastern part of the State can be seen a more remarkable exhibit of stratified rocks showing every change of the seasons and years through which these muds, sands, and gravels were laid down in the old sea. Added to this historic interest of the ride is the wonderful and ever-increasing beauty of the mountains, the woods and stream. The green walls of forest close in on every side, and at each turn of the road new beauties of slope and crag appear, till the journey ends at the very point of the grand cañon as we cross the bridge above the roaring falls, and are in the uplands of the Catskill plateau. From the residence park at the head of the cañon are magnificent views down the narrow valley and out over the wide sunny valley of the Hudson 2,000 feet below.

The Catskills have no commercial value. They are unfit for farming purposes, and are clothed with forests, once very valuable, but now ruined by the too greedy lumbermen, and of only slight present value. The whole range is a comparatively useless wilderness. The rocks themselves have some value, for the mountains are one vast storehouse of bluestone. A wilderness, it is true, but a great and precious heritage for all the people. The Catskills make one of New York's greatest assets, for they are at once a summer home, a sanitarium, and vast

people's camping and forest park. It is something that so magnificent a prospect as that from the top of the eastern wall is in easy reach of the city of New York. It is something that so much of beauty of mountain and valley are in sight of a dozen towns, and in sight of the thousands passing up and down the Hudson valley. A wilderness, perhaps, but a precious wilderness to be forever preserved for the delight and instruction of the people of this country.

The chief impression left upon the mind of the visitor at the Catskills is wonder that a once great and probably level plateau should be carved into such sharp peaks and cañon-like valleys. Could the rain have carved out the rocks to these forms? The rain and the frost, aided by the peculiar slaty character of the rock, undoubtedly did in the long centuries carve the great plateau into its present mountain-like form. Part of the rock is comparatively soft, all of it is full of fissures and readily splits apart under the expansion of ice formed in its fissures. It is quite possible that all of it was once softer and more plastic than now, and the process of tearing down by ice and floods may have been more rapid than at present. However this may be, it is clear that the Catskills are the true children of the rain, whose soft persuasive fingers carved the plateau into its present beautiful mountains and spread the broken wastage far and wide over the country below. In this work of the weather we have also to recognize that the glaciers of the Ice Age may and probably did largely help in the work of modeling the mountains. The great heaps of glacial rubbish at the lower entrance of the Stony Clove valleys would indicate that a vast amount of rock was removed during the time when the plateau was covered with ice. The floods that followed the melting of the ice also helped in the work of carving the peaks and cañons that we so much admire to-day. CHARLES BARNARD.

Catt, Carrie Lane Chapman, American suffrage reformer: b. Ripon, Wis. She was educated at the State Industrial College of Iowa and subsequently studied law. She was for three years principal of the High School at Mason City, Iowa, and in 1884 was married to Leo Chapman, editor of the Mason City *Republican,* who died some two years later. Since 1890 she has devoted herself to woman suffrage work, lecturing frequently in behalf of the movement, and as chairman of the National Organization Committee doing very much to place the reform on a substantial basis. She has been associated in recent years with nearly all of the important gains which have been made in this direction, and the carrying of several state amendments relating to equal suffrage has been attributed to her influence. In 1891 she was married to G. W. Catt (q.v.). She was elected president of the National American Woman Suffrage Association in 1903.

Catt, George William, American civil engineer: b. Davenport, Iowa, 9 March 1860. He was educated at the Iowa State College and subsequently studied engineering and law. He was chief engineer of the San Francisco Bridge Company, 1887–92; president and engineer of the New York Dredging Company, 1893–9; and president and engineer of the Atlantic Gulf & Pacific Company from 1899. He has built government dry docks at the navy yards at League Island, Philadelphia, and Mare Island, California.

Cattaro, kät'tä rō, Austria, a seaport in Dalmatia, at the foot of the Gulf of Cattaro, on the east side of the Adriatic, 38 miles southeast of Ragusa. It lies at the foot of steep limestone rocks, strongly fortified and surmounted by a castle, and is surrounded with walls. The buildings are in the Venetian style, and the streets are narrow, irregular, and dark. It is the seat of a Roman Catholic bishop, and the cathedral is a well-built edifice. The harbor is spacious, but there is not much trade. Pop. (1903) about 6,000.

Cat'tegat, a gulf of the North Sea, between North Jutland to the west, Sweden to the east, and the Danish islands of Zealand, Funen, etc., to the south; about 150 miles from north to south, and its greatest breadth about 90. It is difficult of navigation, being not only shallow toward the shores, and irregular in depth, but obstructed by several sand-banks, and the adverse winds which often prevail here increase the danger. The Cattegat is noted for its herring-fishery. It contains the islands Samsöe, Anholt, Lessöe, and Hertzholm.

Cattell, James McKeen, American psychologist: b. Easton, Pa., 25 May 1860. He graduated at Lafayette College in 1880, and studied at Leipsic, Paris, Geneva, and Göttingen. He was assistant under Wundt at the University of Leipsic, professor of pyschology in the University of Pennsylvania in 1888–91, and became professor of experimental psychology in Columbia University in 1891. He is co-editor of the 'Psychological Review' and 'Science.'

Cattell, William Cassidy, American educator: b. Salem, N. J., 30 Aug. 1827; d. Philadelphia, Pa., 11 Feb. 1898. He was graduated at Princeton in 1848, and at Princeton Theological Seminary in 1852. He was professor of Latin and Greek in Lafayette College, 1855–60, and president of that institution, 1863–83, and subsequently prominent in the Presbyterian Church.

Cat'termole, George, English water-color painter: b. Dickleburgh, near Diss, Norfolk, 8 Aug. 1800; d. Clapham, Surrey, 24 July 1868. Like Turner and William Hunt, he started in life as a topographical draughtsman, and was employed as a draughtsman on Britton's 'English Cathedrals' when only 16. He drew the designs for the illustrations of various annuals, the Waverly Novels, for an edition of Shakespeare, and for his brother's 'History of the Civil Wars.' In 1833 he was elected a member of the Society of Painters in Water-colors. He was a member also of the Academy at Amsterdam, and of the Belgian Society of Water-color Painters. He obtained a medal of the first class at the Paris Exhibition of 1855. In 1851 he resigned his membership of the English Society, and devoted himself to oil-painting. Among the best known of his pictures are 'Hamilton of Bothwellhaugh about to Shoot the Regent Murray'; 'Luther at the Diet of Spires'; 'The Armorer's Tale'; 'A Terrible Secret,' etc.

Catti, kat'tī, one of the most renowned and valiant of ancient German tribes, inhabiting what is now Hesse, also part of Franconia and Westphalia. They carried on bloody wars with the Hermunduri and Cherusci. In the time of Cæsar they dwelt on the Lahn, and

"ROUNDING UP" CATTLE ON A GREAT WESTERN RANCH.

opposed him with effect. Drusus defeated without reducing them. In the reign of Marcus Aurelius they made incursions into Germany and Thrace, but were afterward defeated by Didius Julianus. In 392 they made their last appearance in history in union with the Franks. According to Cæsar, their territory was divided into 100 districts, each of which was obliged to send annually 1,000 men into the field, whose place was supplied the following year by those who had before remained at home to cultivate the ground. Their food was milk, cheese, and game; their dress the skins of animals. Their limited princes, who governed in connection with a diet, annually distributed the lands among the families.

Cattle, a term of rather indefinite use, but usually referring to domestic animals of the bovine family, more specifically termed oxen. The various domestic races will be found treated under BUFFALO, DAIRYING, DOMESTIC ANIMALS, and OX; wild oxen under AUROCHS, BISON, BUFFALO, URUS, etc.

Cattle Feeding. See NUTRITION OF FARM ANIMALS.

Cattle-plague, any plague by which large numbers of cattle are destroyed. Such plagues have existed at intervals, more or less, in all countries and in all ages. Among the severer visitations in centuries preceding the 19th may be mentioned a great plague which arose in Hungary in 1711, whence it spread to other countries, destroying in the next three years about 1,500,000 head of cattle. A second visitation, which affected England and the west of Europe between 1745 and 1756, caused the death of 3,000,000 cattle. See RINDERPEST.

Several of the diseases of cattle are due to insects, including that called "pleuro-pneumonia" or "Texas cattle fever," which is caused by a blood-inhabiting sporozoon that is carried by ticks from an infected animal to a healthy one, communicating the disease. Cattle bred in the southern States have become practically immune, but the disease affects and kills northern cattle. The natural limit of the tick concerned (*Boophilus annulatus*) nearly coincides with Mason & Dixon's line, and federal laws prohibit the shipping north of any cattle from south of this line, except between 15 November and 15 February. Other species of this same genus of ticks transmit similar cattle diseases in various parts of the world, especially the "blue tick" (*B. decoloratus*) of South Africa. The remedy is to dip the cattle in vats of cotton-seed oil or some similar mixture. See CATTLE-TICK.

The appellation "cattle-plague" is also loosely given to another disease among cattle in the United States, which is otherwise known as "lumpy-jaw," a most virulent and incurable affection. Experiments have been time and again ineffectually tried to find a cure for this, though large governmental encouragement has been offered. A rigid examination of cattle is made by government inspectors at all receiving and shipping ports.

Cattle-tick, or **Texas-fever Tick,** an arachnid (*Boophilus annulatus*) related to the mites, and prevalent in the western and southwestern States. It is a reddish, coriaceous, flattened, or swollen creature from a quarter to half an inch in length. The cattle-tick lays a great many eggs, nearly oval, dark-brown, coated with a hard secretion, the process of egg-laying lasting for several days or a week. The young tick, on hatching, is whitish, afterward turning brown; it has three pairs of legs. After molting it becomes a nymph, when the fourth pair of legs is added. During the nymph stage the reproductive organs develop. After another molt it becomes sexually mature. It completes its development from the larva to the adult on cattle. After this second molt the couple pair, and the male grows but little. The female, voraciously feeding on the blood of her host, grows to a gigantic size, her body swelling and becoming gorged with blood and eggs. The males can be easily detected by their smaller size, and by the extension of the shield over the entire back. Ticks live upon the blood of their host. The females, as they increase in size, store away quantities of the ingested food in an immense convoluted chamber or appendage of the stomach. In summer only three or four days after the final molt are necessary for the ticks to become large. When fully gorged, and the eggs have become fertilized, the female loosens her hold in the skin of her host, and falls to the ground, where she lays her eggs, after which her body contracts, shrivels up, and then dies. The young ticks get access to cattle by climbing bushes, whence they reach out and attach themselves to passing animals.

It has been proved that ticks, by sucking the blood of cattle infested with the Texas fever germ, which is a sporozoon (*Apiosoma bigeminum*), may communicate the disease (bovine malaria) to healthy cattle, just as the sporozoan blood-parasite of yellow fever, or of malaria, is communicated by a mosquito (*Anopheles*). In dealing with ticks it should be remembered that it breathes by spiracles, or minute holes in the sides of the body. By the use of oil, or any greasy substance, those openings may be covered, thus asphyxiating the creature. The ticks may thus be killed by dipping or spraying the cattle with cotton-seed oil. Cattle should be kept away from wooded or bushy pastures.

There are one or two forms very closely allied to the Texas cattle-tick, and named *Boophilus australis;* they are regarded by experts as either distinct varieties or species from *B. annulatus.* They transmit the cattle-fever in the countries above named. Another sub-species or variety, the blue tick (*B. decoloratus*) in South Africa transmits the same disease in that region.

The Lone Star tick (*Amblyomma unipuncta*) is, next to the cattle-tick, to be held responsible for the transmission of the Texas fever. It may be recognized by the simple bright silver spot on the back.

Consult Curtice, 'The Cattle-Tick' ('Journal of Comparative Medicine and Veterinary Archives' 1891–2); Salmon and Stiles, 'Cattle-Ticks of the United States' ('17th Annual Report of the Bureau of Animal Industry,' Washington, 1902).

Catty, a standard of weight in China and the Malayan Archipelago. In China, the Straits Settlements, Java, British North Borneo, etc., it is approximately one and a third pounds. The Siamese catty is equal to 2.675 pounds.

Catubanganes, kâ-too-bän gans', or **Catabangenes,** warlike tribes settled in the mountains of Guinayangan, in the province of Tayábas (Luzon). Through lack of available information nothing can be said about their race affiliations, whether they be pure Malay or Negrito-Malay. They are probably Remontados mixed with Negrito blood and gone wild.

Catubig, kä-too-bĭg', Philippines, a small town in the island of Samar, 48 miles north of Catbolagan. The place is garrisoned by United States troops, who, in June 1900 withstood an attack by 600 insurgents. This episode was a stirring incident of the war. Pop. 9,565.

Catul'lus, Valerius (whose prænomen is stated by some to be Caius, by others Quintus), Roman poet: b. Verona 86 B.C.; d. after 47 B.C. He went in his youth to Rome, where his accomplishments soon won him the favor of those who adorned that splendid era. He was the friend of Cicero, of Plancus, Cinna, and Cornelius Nepos; to the last he subsequently dedicated the collection of his poems. This collection is not of great extent, but shows what he was capable of doing in several kinds of poetry, had he preferred a steady course of study to pleasure and traveling. Probably a part of his poems have not come down to us. Of the merit of his productions there has been but one opinion among the ancients as well as moderns. Tibullus and Ovid eulogize him; and Martial, in one of his epigrams, grants to him alone a superiority over himself. In sportive composition and in epigrams, when he keeps within the proper limits of that species of poetry, he is a model. He succeeded also in heroic verse, as in his beautiful episode of Ariadne, which appears to have inspired the poet who afterward sung of Dido. He was the first of the Romans who successfully imitated the Greek lyric poetry. The four odes of his that remain to us make us feel a lively regret for the loss of the others. A weighty objection, however, against most of his writings, is their licentiousness and indelicacy. The common opinion is that he died 57 B.C., in the 30th year of his age, but this is no doubt erroneous, as there are allusions in his own works which prove him to have been alive in the consulship of Vatinius, as late as 47 B.C. Scaliger maintains, but without sufficient proof, that he died in his 71st year. An excellent English translation of Catullus in the original metres is that of Robinson Ellis, who has also published an admirable annotated edition of the Latin text (1878).

Cat'ulus, Quintus Lutatius, Roman general, historian, and poet: b. about 152 B.C.; d. 87 B.C. He was consul in 102 B.C. with Gaius Marius, and in the following year was proconsul. During his proconsulship he, with Marius, defeated the Cimbri near Vercellæ, the modern Vercelli, in northern Italy. As one of the aristocratic party and a partisan of Sulla, he was proscribed by Marius. With the exception of two epigrams nothing of his work has survived.

Caub, kowb, Prussia, a town in the province of Hesse-Nassau, on the Rhine, 30 miles west-northwest of Wiesbaden. Here Blücher crossed the Rhine with his army, 1 Jan. 1814, and here, too, till 1866, toll was levied by the Duke of Nassau — the only ruler who kept up this feudal privilege — from vessels navigating the Rhine. Caub has slate quarries, and opposite, on an island in the river, where Louis le Débonnaire died in 840, is a castle called the Pfalz, built in 1326, which is said to have been resorted to for safety by the Countess Palatine. In 1876 and 1879 Caub was the scene of two serious landslips.

Cauca, kow'kä, Colombia, one of the nine departments of the Republic, bounded on the northwest by Panamá; on the north by the Caribbean Sea; on the east by the departments of Bolivar, Antioquia, Tolima, and Cundinamarca, and the Republics of Venezuela and Brazil; on the south by Brazil and Ecuador; on the west by the Pacific Ocean. The territory of Caquetá and the districts of Huila, Inzá, and Páez are included in this department. The eastern part of Cauca is watered by the Amazon and some of the affluents of that river; the Guaviare and the Casiquiare flow into the Orinoco; the Atrato empties into the Gulf of Urabá; while a dozen smaller rivers flow into the Pacific. On both the Caribbean and Pacific coasts there are several ports. For area, population, etc., see COLOMBIA.

Cauca, a river in Colombia, South America, an important tributary of the Magdalena; length, 600 to 700 miles. Its course is mainly northerly, and it forms many waterfalls. It gives its name to the largest department of Colombia.

Caucasian (kô-kā'shan) **Race,** a term introduced into ethnology by Blumenbach, in whose classification of mankind it was applied to one of the five great races into which all the different nations of the world were divided. Blumenbach believed this to be the original race from which the others were derived, and he gave it the epithet of Caucasian because he believed that its most typical form — which was also that of man in his highest physical perfection — was to be met with among the mountaineers of the Caucasus. The physical superiority of these people is scarcely maintained at the present day, but the name is still retained in classifications. The Caucasian race comprises the most highly civilized nations of the world, including most of the inhabitants of Europe (the Turks, Hungarians, and Fins being excluded); the Hindus, Persians, Arabs, Hebrews, and the ancient Phœnicians of Asia; and a large proportion of the inhabitants of northern Africa. See ETHNOLOGY.

Caucasus Mountains, a lofty and rugged range of mountains forming one of the natural barriers between Europe and Asia. It extends in a northwest and southeast direction from near the strait of Kerch on the Black Sea to near Baku on the Aspheron peninsula projecting into the Caspian Sea. The distance between these points in a straight line is 700 miles, but following the main ridge of the mountains about 940 miles. The range varies in width from 30 to 130 miles, and may be divided into three parts. The western portion, extending from the Strait of Kerch and the Sea of Azov to the peak of Elbruz, consists of a series of parallel ridges of stratified rocks, the ridges apparently formed by huge, tilted fault blocks. The northern slopes of the northern ridges rise rather gently out of the plain of Caucasia; the southern slopes, along the fault

planes, are abrupt; and the southern slope of the main ridge has in places almost vertical walls 2,000 to 3,000 feet high. There are few passes through this great barrier, and these are difficult. The snow line is at about 9,000 feet.

The highest peaks of the Caucasus are in the central part, from Elbruz to the Adai-Khokh. Here, as to the westward, is a series of parallel ridges, the higher summits all snow-clad, with deep longitudinal valleys; but some of the highest peaks, Elbruz and Kazbek, are on spurs more or less isolated from the main range. In this central portion of the Caucasus, as yet but incompletely mapped, there are said to be fully 20 summits higher than Mont Blanc, the highest peaks being Elbruz, 18,470 feet; Dykh-tau, 17,054 feet; Koshtantau, 16,881 feet; Jang-hitau, 16,564 feet; and Kazbek, 16,546 feet. The snow line is at about 11,500 feet, and the total number of glaciers of the first class is fully 175, while rounded rock surfaces and boulders in the valleys show that glaciation was much more extensive at no very distant time. East of Kazbek the range narrows and is narrowest south of Vladikarkaz, where it is crossed by the Russian military road to Georgia. This road runs over the Kobi Pass and through the great Davial gorge, one of the greatest mountain chasms in the world. The eastern part of the Caucasus, from Kazbek to the Caspian, is of much more complicated structure; the range widening and including a high plateau crossed by subordinate ranges having an east-northeast and west-southwest direction, though what may be termed the main axis continues its southeast course.

The plains of Caucasia north of the mountains are underlaid by Tertiary and Quaternary strata. The foot hills of the western Caucasus and the plateau of the eastern Caucasus show rocks of Cretaceous and Jurassic age, and nearer the main axis of the range are Palæozoic formations. The main axis shows schists and gneisses with granite and syenite. Trachyte and similar rocks occur, and some of the peaks, Kazbek, are probably in part of volcanic origin.

The scenery of the Caucasus is wild and gloomy rather than beautiful. The lower slopes are thickly wooded, but there is not the combination of dark forests, beautiful lakes and graceful snow-crowned summits that makes some ranges — for instance the Selkirks in British Columbia — so attractive to the mountain-climber.

The mineral wealth of the Caucasus is very great; in fact, in this respect the range is one of the most noteworthy in the world, but owing in part to the very rugged topography much of this wealth is still undeveloped. Among the valuable resources may be named the coal fields near Ochemchiri and at Kuban and Kutais, the copper mines of Tiflis and Elizabethpol, and the silver ores of Terek and Kutais. More important are the manganese mines near Kutais, whence some 500,000 tons of ore were exported in 1900 to various European countries and the United States. Most important of all are the oil wells of the Aspheron peninsula, the most remarkable in the world, whence some $12,000,000 worth of petroleum, benzine, etc., were shipped to foreign countries in 1900. Consult: Bodenstedt, 'The People of the Caucasus'; Deniker, 'Races of Man'; Keane, 'Man, Past and Present'; Ripley, 'Races of Europe.'

Cauchy, Augustin Louis, ô-güs-tăn loo-ē kō-shē, French mathematician: b. Paris 21 Aug. 1789; d. there 23 May 1857. He published in 1815 a 'Treatise on the Theory of Waves,' which was afterward made the basis of the undulatory theory of light. Between 1820 and 1830 he wrote several important treatises, and at Prague, where he resided as tutor to the Comte de Chambord, he published his 'Treatise on the Dispersion of Light' (1837). From 1848 to 1852 he was professor of astronomy at Paris, but refused the oath of allegiance to Napoleon III., and lived in retirement till his death. See 'Life,' by Valson (1868).

Caucus (short for "caucus club"), a political party gathering for nominations or conference on party policy, as distinguished from a merely hortatory one. It may be a town or ward meeting, to nominate local candidates or delegates to higher nominating conventions (the latter sort are also called "primaries"); or a party conference of members of Congress or a legislature, to decide on members or confirmations to office. Originally, a secret gathering on the model of the Caucus Club of Boston, whose leading business was the making of "slates" for local offices, and incidentally came to be the molding of a policy of local autonomy in opposition to British influence. The etymology of the name is pure guesswork. The usual derivation from "caulkers" (sc. club), or an imaginary "caulk-house," is most improbable. More plausible would be that from Lat. *caucus*, Gr. *kaukos*, a cup, as originally a convivial society, most secret societies of that day having classical names or initials; the words, however, are not classical, but mediæval, and so are less likely to have come under their notice. Possibly, though not probably, it is mere alliterative comic jargon. Most probable of all is the adoption of an Algonkin word, *kaw-kaw-wus*, to consult: — if the word is real: cf. "pow-wow." At all events, the club and the elements of the system originated in Boston during the 18th century. Samuel Adams' father was accredited as a founder and eminent master of the art, in which his son became immortal, and to which he owed his first election to the legislature. The preparation and distribution of ballots before the election was one of its chief instrumentalities. The first mention of the original club is in John Adams' diary, February 1763: he says the town officers are "regularly chosen there before they are chosen in the town," and intimates that the distribution of business favors as a *quid pro quo* was not absent, which might be assumed.

The system rapidly grew; indeed, in some form it is part of the inevitable machinery of majority rule, which in constitutional countries has supplanted the primitive decision of battle by merely counting the opposing hosts, it being assumed as a basis that the larger could outfight the smaller. But for common action of that majority there must be some method of determining its will before the elections, as to both measures and men; and all countries with any measure of popular control have some shaping and testing mechanism of the sort. In England it has been formally established since 1880, by the so-called "Birmingham system"; but in the higher lines of policy, even before that, the two great political clubs of London, the Carlton and the Reform, Conservative and Liberal, discharged much of the functions of

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informal caucuses. Nevertheless, the power of the caucus is greatly affected by local and national circumstances. In England and most continental countries, it is restrained, by the still powerful aristocratic system, which forms a counterpoise and provides natural leaders; in France, by the centralized government system. In no other country has it the same authoritative power as in the United States. Early in our history it became universal. Said Adams in 1814: "We have Congressional caucuses, State caucuses, county caucuses, city caucuses, district caucuses, town caucuses, parish caucuses, and Sunday-school caucuses at the church doors." This is primarily due to the entire legal equality of all classes; that absence of prescriptive privileges furnishing a shelter for minorities and independent action, which is considered the chief glory or the chief danger of democracy, according to the point of view. The gradations of the American political system into national, State, district, and municipal powers have produced a corresponding hierarchy of caucuses, each sending delegates to the next higher caucus or convention, and constituting a "machine" of great efficiency and formidableness.

But it has been made at once practically irresistible, and largely worthless for its ostensible purpose of determining the general sentiment of the party, by the "spoils system," which throws the organization and management of the caucuses into the hands of those who can give their whole time to political work, because paid for this service (in reality though not in name) out of the public treasury. Thus managed, the caucus in the larger places does not necessarily represent the views of the majority, and very often the leading object is to prevent the majority from meddling with the machine. In theory, the caucus being a voluntary association of the members of a voluntary association, to deliberate as to its policy and agents, all are fairly bound by its decisions, and have no right to "bolt" afterward; otherwise there is an end of all common action. It is of course to the interest of the managers to cultivate this theory, and the military similes of "campaigns" and "forces" and "deserters" and "closing up ranks," etc., and to stigmatize all individual courses as equivalent to treachery and insubordination; and no matter how spurious this technical majority may be, or by what methods a real minority may have attained a seeming vote of confidence, a "regular" nomination will always have enormous weight. In part, it is true, this is because the vast majority have no common wish or purpose, and are destitute of constructive political ideas; and any pronouncement of the constituted party authorities is really their will, which is simply to obtain such a mandate. Hence, "regularity" is the test of merit; and this willingness to accord to the show what belongs to the substance is the almost invincible bulwark of political corruption.

This has generated in the last few years a host of efforts, public and private, to break down the monopoly of the caucus and substitute a real and direct control of nominations by the party; control of policy cannot thus be shifted, but corruption is the work of men, not of measures. It cannot be said that any of these movements as yet are very successful or promising, largely owing to the consideration just mentioned, that the initial possession of political ideas is a condition precedent to expressing them. One scheme is to have nominations made by direct popular vote instead of by primaries; but this simply shifts the function of the caucus one stage back, to decide on the votes for nomination instead of the votes for offices. More elaborate, and in some directions more efficient, are the legislative provisions made in several States for taking the primary caucuses themselves under the control of the law, as elections have always been. In this case, all persons who wish to vote in a party caucus must register themselves as members of that party. The effects of this measure have been a singular mixture of good and evil, and probably reflect in this regard the motives of the enactment. On one hand, faction leaders can no longer swamp a caucus with a rabble of purchased voters from the lowest element of the other party. In theory a check list was always used; but as it had no legal validity, it was scouted whenever a majority, real or spurious, was interested in evading it. The check list under the law cannot be so treated. On the other hand, an obvious effect of the law, probably not absent from the minds of the framers, is to extinguish as a party force the independent or "mugwump" element of both parties, who try to reform their own party by a leverage obtained from the other; and are therefore excluded from either, as they cannot keep changing registration. If this was a motive, the Nemesis has been speedy. The party managers in various places are greatly disappointed and alarmed to find that only a fraction even of their normal and calculable voting strength will register at all, and therefore they are nominating in the dark, without knowing what the party sentiment is. When they honestly wish to ascertain the party feeling, they have great difficulty in doing it. The dislike to sporting a registered, public, and unchangeable party label is not confined to the more intellectual independents, but is strong in the general mass; and the attendance at primaries is a much less sure guide than of old to what the party will support at the polls. The precise future of the caucus cannot be forecast; but there is little evidence thus far of a loosening of its hold.

Congressional Caucuses for President and Vice-President.— These grew out of the Electoral system (see ELECTORAL COLLEGE), and perished, significantly, at the same time that the old theories of an educated official class and professional trained office-holders gave place to the inrush of the untrained democracy and rotation in office. It is no mere coincidence that the last Congressional caucus was held to nominate a candidate in the last election that returned a President of the old school. The masses were taking everything into their own hands; Jackson and popular nominations came in together, though there was one intermediate link when the people acted through the State legislatures. The theory of the Electoral system was that the electors, themselves the chosen sages of the people, should make free choice of the best men in the country for the chief executive offices; but from the first their choice was pointed out in advance. While Washington lived and would take office, no other candidate for President was possible; and for his first Vice-President, John Adams was the choice of New England,

and the other States had either their "favorite sons" or no special wish. In 1792 the same circumstances controlled; though New York's favorite, George Clinton, won the support of several southern States. The electors deferred to the notorious public feeling; but their action was nominally independent. In 1796 this was still true of the Federalists, who made a combination of North and South on Adams and Pinckney; it was substantially true of the Republicans, for Jefferson was the undisputed leader, and while the Republican members of Congress informally agreed to support Burr, there was no set ticket for the electors to support at party peril. But in 1800 both parties held regular but secret caucuses, and adopted tickets which the electors voted solidly and even stupidly, with results still memorable. The Federalists voted that Adams and Pinckney should be supported alike. The point of this was that up to that date, there was no distinct candidate for President and Vice-President, the one who received the largest electoral vote being President and the next one Vice-President. Adams was certain to receive no Republican votes; but if all the northern Federalists voted for Pinckney, he as a popular Southerner would probably receive some stray votes from that section, and so be elected President over Adams, whom the Federalists hated but did not wish to bolt. Thus they would defeat him by appearing to keep strict party faith. The Republicans on their part held a caucus, and made a similar agreement with regard to Jefferson and Burr; not with similar designs, but to placate New York, which complained that her candidates were "knifed" in the South. Of course in both cases, if the whole electoral body voted "straight," there would be a tie and no election. This actually happened in the case of Jefferson and Burr, and the struggle was only settled after 36 votes. The results were the adoption of the Twelfth Amendment to the Constitution, regulating presidential elections and compelling electors to state which candidate was to have which office; the implacable hostility of Jefferson to Burr, which killed the chance of the latter to rise further in his party, drove him into the arms of the Federalists, and ultimately ended in the murder of Hamilton; and as the presidential electors had simply voted the tickets dictated by the party representation in Congress, they instantly became as they have ever since remained, nullities. The second occasion was on 29 Feb. 1804, when the Republicans (in open, not secret caucus) renominated Jefferson; they dropped Burr for George Clinton (New York still keeping the place), by 67 votes to 20 for Hugh H. Breckinridge of Pennsylvania, and some scattering. The Federalists held no ostensible caucus; but as they were scheming to support Burr for governor of New York, and with that prestige nominate him for President, the plan must obviously have been agreed on in what served the purpose of caucuses. Burr's killing of Hamilton spoiled this scheme, however: they nominated Pinckney and King, and were almost annihilated. The third caucus was on 23 Jan. 1808, also by the Republicans; but only two thirds of the party members attended, as the conclusion was foregone. Madison and Clinton were nominated. Meantime the Virginia legislature had split into Madison and Clinton factions, the former much the stronger; nominated separate sets of electors and carried the quarrel into Congress, where Monroe's party issued a manifesto protesting against both Madison and Congressional caucuses. The Federalists held none, and renominated their previous candidates. On 18 May 1812 the Republican or Democratic party held its fourth caucus, and renominated Madison on his express agreement to declare war against Great Britain; also nominating Elbridge Gerry for Vice-President. This time they appointed a national committee to see that the nomination was respected. The New York Democrats, however, were very restive under the "Virginia dynasty" and the "secretary of state dynasty"; and their members of the legislature held a caucus, nominated George Clinton, and protested against the Congressional caucus as always nominating a Virginia candidate. A secret caucus or convention of Federalists was held in New York in September, adopted the Clinton nomination, and nominated Jared Ingersoll for Vice-President. On 29 March 1816 the Democrats, now practically the only existent party, held the last caucus which accomplished anything. Henry Clay and another member introduced resolutions that the caucus nominations be abolished, but were voted down; and Monroe was nominated, by no great margin over Wm. H. Crawford of Georgia. Daniel D. Tompkins of New York was nominated for Vice-President. In 1820 a caucus was summoned, but only about 50 members responded, and they took no action. The general feeling was now strong against the system, as there was but one party, and a nomination by Congressional caucus was equivalent to allowing Congress to appoint the President and Vice-President. In 1824 several State legislatures passed resolutions forbidding the State representation in Congress to attend a caucus if one were called. But the Crawford party, who wished to give his nomination the prestige of a national verdict, held one at which about a fourth of the members attended, and nominated him and Albert Gallatin. It can hardly have gained him much support, however, and a paralytic stroke finished whatever chance he might have had. In the next (1828) campaign, the State legislatures made the nominations; and in 1832 the nominating convention was introduced. See UNITED STATES — BEGINNINGS OF PARTY ORGANIZATION.

Cauda-galli Grit, or **Esopus Shale,** one of the basement members of the Devonian System in New York and New Jersey. The name ("cock's tail") is from a characteristic fossil, supposed to be a seaweed.

Caudex, in botany, the stem of a tree, more especially the scaly trunk of palms and tree-ferns. It often appears as a rhizome running along the surface of the earth or underground.

Cau'dine Forks, a pass of southern Italy, in the form of two lofty fork-shaped defiles, in the Apennines (now called the valley of Arpaia), into which a Roman army was enticed by the Samnites, 321 B.C., and being hemmed in was forced to surrender.

Cau'dle's Curtain Lectures, Mrs., a series of humorous sketches by Douglas Jerrold (q.v.).

Cauer, Emil, ā'mēl kow'ėr, German sculptor: b. Dresden 29 Nov. 1800; d. Kreuznach 4 Aug. 1867. He studied at Berlin under Rauch and at Munich under Haller; in 1825 he went to Bonn where he was instructor in art at the university; in 1832 he was appointed drawing master at the gymnasium at Kreuznach. Among his best works are 'Sickingen'; 'Charles V.'; 'Melanchthon'; and the representations of Red Ridinghood and other fairy tale characters. He also restored the antiques in the museum at Dresden.

Cauer, Karl, German sculptor: b. Bonn 14 Feb. 1828; d. Kreuznach 17 April 1885. He studied with his father, Emil Cauer (q.v.), and with Wolff in Berlin; he also visited London several times in order to study the Parthenon friezes. Among his works are the Schiller monument at Mannheim, 'The Witch' and a number of portrait busts. In his later life he became interested in the question of coloring sculptures, and made a number of experiments in that line.

Caughnawa'ga, kô-nā-wā'gą, Canada, a town in the province of Quebec, situated on the St. Lawrence River, near the Lachine Rapids, opposite Lachine. It is an Indian town, and was established by the Jesuit missionaries in 1676 as a colony for the Indians who were converted to Christianity. The converts were Iroquois, mostly Mohawks, and remained loyal to the French during their quarrels with other Indians and the English. In the Canadian insurrection of 1838 Caughnawága was the first place to be attacked by the rebels, who were repulsed by the Indians and a number of them taken prisoners. Pop. 2,000.

Caul, a membrane enclosing the viscera, such as the peritoneum or part of it, or the pericardium; also the amnotic membrane that surrounds all fœtal structures and sometimes becomes caught by the head of a child at birth. Many superstitions have been connected in the past with cauls. The child that happened to be born with one was esteemed particularly fortunate; and the possession of it afterward, however obtained, was highly prized, as of a charm of great virtue. The superstition is thought to have come from the East. With the French, *etre né coiffeé* was an ancient proverb, indicative of the good fortune of the individual. The alchemists ascribed magical virtues to it; and, according to Grose, the health of the person born with it could, in after life, be judged of by its condition, whether dry and crisp, or relaxed and flaccid. Medicinal virtues were imputed to it by the ignorant, as well as the property of preserving the owner of it from drowning. It has been bought and sold occasionally at a high price, sailors having been known to give as much as $150 for a single caul.

Caulaincourt, kō-lăń-koor, **Armand** (ärmäń) **Augustin Louis de,** Duke of Vicenza, French statesman: b. Caulaincourt (Aisne), 9 Dec. 1772; d. Paris 19 Feb. 1827. He early distinguished himself as an officer, was made a general of division in 1805, and shortly after created Duke of Vicenza. Faithful to the last to Napoleon, he was made Minister for Foreign Affairs in 1813, and during the Hundred Days resumed the office, receiving a peerage of France, of which he was deprived after the Restoration.

Cauliflower, a member (*Brassica oleracea,* var. *botrytis*) of the cabbage tribe, derived from the same original species as cabbage (q.v.), from which it differs in having a more or less compact head of metamorphosed flowers and adjacent parts instead of a bud-like head of densely packed leaves. Broccoli is a late hardy form of cauliflower not widely grown in America. Cauliflower is more delicately flavored than cabbage, like which it may be cultivated and prepared for the table. In its cultivation, however, it seems to be more difficult to bring to perfection unless conditions, especially moisture and temperature, are just right. The essentials of its cultivation are highly fertile soil well drained, but well supplied with moisture, a moist climate or season, and shelter from the direct rays of the sun, as on a northern slope, or reduction of the intensity of the sun's heat by planting either very early so as to mature in spring, or late so as to mature after mid-autumn. The heads produced in midsummer are generally inferior in both size and quality. When the heads begin to develop, the leaves are tied above them so as to keep out foreign materials, but mainly to make the heads whiter and more attractive to the purchaser. In preparing for the table the finer heads are usually served with a cream sauce; the poorer ones being pickled. In comparison with cabbage seed, the seed of cauliflower is very expensive because of the difficulty of maintaining its high quality. Formerly the seed was imported from Denmark and Germany, but Washington and British Columbia have been gaining in the market with their cauliflower, cabbage, and other related seeds.

Cauliflower suffers from the same enemies that attack cabbage. Consult: Bailey, 'Cyclopedia of American Horticulture'; Allen, 'Cabbages, Cauliflowers, etc.'

Caulking, Calking, or **Cauking,** the act of rendering the seams of a ship water-tight by driving oakum, cotton, or the like, between the planks in the ship's decks or sides, in order to prevent the entrance of water. After the oakum is driven hard into the seams it is covered with hot melted pitch, to keep the water from rotting it.

Caulop'teris, a genus of fossil tree-ferns found in the coal-measures.

Caura, kow'ra, a river of Venezuela, rises among the sierras of the frontier, and flows north-northwest to the Orinoco. On both sides stretches the territory of Caura (22,485 square miles), with immense forests of valuable woods.

Caus, or **Caulx, Salomon de,** French engineer: b. Dieppe 1576; d. Paris 6 June 1626. He was in the service of the Prince of Wales in 1612, and of the Elector Palatine, at Heidelberg, 1614–20, but by 1623 returned to France, and became engineer and architect to the king. At Frankfort, in 1615, appeared his 'Causes of Kinetic Energy,' a work in which is described an apparatus for forcing up water by a steam fountain, differing only in one detail from that of Della Porta. There is no reason to suppose that the apparatus ever was constructed, but on the strength of the description, Arago has claimed for De Caus the invention of the steam-engine.

Cause, that which brings about any change in the state, condition, circumstances, etc., of things; that which produces an effect.

In philosophy, that by which something known as the effect is produced, and without which it could not have existed. To give a satisfactory notion of all the senses in which this word has been used it would be necessary to review all the teachings of metaphysics from the time of Aristotle downward. The various positions of the conflicting philosophers can here be only very briefly indicated. Aristotle states causes to be of four kinds: efficient, formal, material, and final. The efficient is the force or agency by which a result or effect is produced; the formal the means or instrument by which it is produced; the material, the substance from which it is produced; the final, the purpose or end for which it is produced. A scientific cause demands the recognition of all the essential conditions, any one of which being absent the effect could not take place. Locke finds the origin of the notion of cause in sensation. Assuming that bodies have the property of modifying each other, it is only necessary to observe them to perceive and be driven to admit the principle of causality. Hume declares the power which we attribute to one object over another to be a chimera; such a power does not exist, or if it does we can have no idea of it. What we call cause and effect is merely two phenomena always following in the same order, and which we have fallen into the habit of associating in our minds in such a way that on perceiving the first we inevitably expect the second. According to Leibnitz there is no existence, however humble, but is a force, that is, a real cause. The notion of force is the base even of the notion of existence; all that which is has a certain virtuality, a certain causative power. The human soul, like all the other limited forces in this world, is but a monad isolated in itself, but yet in whose inner being the whole creation is reflected, and whose movements have been from the beginning co-ordained by Divine Wisdom with the harmonious movement of the universe. Kant's doctrine is that the notion of cause and the principle of causality certainly exist in our minds; but they are only simple forms of our understanding, or the entirely subjective conditions of thought. We are compelled by a law or a form pre-existing in our intellect to dispose all the objects our imagination represents, or all the phenomena our experience can discover, according to the relation of cause and effect; but we do not know if anything really exists, independent from our intellect, which resembles a cause, a force, or effective power. Against the doctrines of the intuitionalists it has been urged that the mere statement that the mind possesses a belief in causation proves nothing: some men believe in it, others do not, and unanimity is necessary to the establishment of a universal belief. Nay, more, the mere universality of a belief is no conclusive proof of its correctness, as put in the words of the late John Stuart Mill—"A mere disposition to believe, even if supposed instinctive, is no guarantee for the truth of the thing believed. If, indeed, the belief amounted to an irresistible necessity, there would be no use in appealing from it, because there would be no possibility of altering it. But even then the truth of the belief would not follow: it would only follow that mankind were under a permanent necessity of believing what might possibly not be true; just as they were under a temporary necessity, — quite as irresistible while it lasted — of believing that the heavens moved and the earth stood still. The things which it has been supposed that nobody could help believing are innumerable, but no two generations would give the same catalogue of them." The theological question of a First Cause is debated on the ground that matter of itself is inert, that spirit is active, that in order of existence one spirit or active force must be the first and uncaused cause.

In law, a cause is a right of suit or action; it is something for which suit may be brought by someone against another; it includes the right of action. In practice, a cause of action comes into existence when there is such a state of facts or circumstances as will enable a person or party having certain relations with particular persons or property to commence a suit. Cause includes the right, but right may not include a cause; as a person may have a right of action which is barred by lapse of time, and as soon as the time expires the cause ceases.

Causeries du Lundi, kōz-rē dù lĕn-dē, a famous series of literary criticisms by Sainte-Beuve. Every prominent name in French literature, from Villehardouin and Joinville to Baudelaire and Halévy, is here exhaustively discussed. Sainte-Beuve widened the scope of criticism by inventing what has been called "biographical criticism." He endeavors to explain the work by the character of the author, his early training, his health, his idiosyncrasies, and above all, by his environment. The 'Causeries' were first published as feuilletons in the papers. They may be divided into two distinct classes: those written before, and those written after, the Restoration. In the former there is more fondness for polemics than pure literary purpose; but they represent the most brilliant period in Sainte-Beuve's literary career. After the Restoration, his method changes; there are no polemics; however little sympathy the critic may have with the works of such writers as De Maistre, Lamartine, or Béranger, he analyzes their lives solely for the purpose of finding the source of their ideas.

Caustic, in medicine, any agent that causes a destruction of the parts. Caustics act by withdrawing water from the skin, by coagulation of the albumen or by other chemical change. Thus caustic soda and caustic potash act by the abstraction of water. They further act on fats, saponifying them, and are particularly serviceable as caustics if penetration is desirable. Sulphuric acid acts in much the same way, but it is very difficult to control its caustic action. Others of the acids are used as caustics, nitric, glacial acetic, tri-chlor-acetic, etc. Many mineral salts, silver nitrate, zinc sulphate, zinc chloride, copper sulphate, arsenic, etc., are valuable caustics. The most reliable caustic is the actual cautery, using a dull red flame. Caustics are used to stimulate the growth of granulating wounds, to remove warts, condylomata, etc., to cleanse ulcers, remove cancerous growths, to prevent poisoning by dog-bites, etc. See ESCHAROTICS.

In mathematics, the curve to which rays of light are tangent after reflection from a surface or refraction by a lens. Opticians endeavor so to shape their mirrors and lenses as to make the

caustic two intersecting straight lines. When this is achieved, the "spherical aberration" disappears. Caustic curves may often be seen on the bottom of a cup, produced by reflection from the curved wall of the cup. See also LIGHT.

Cauterets, kō-tē-rā, a watering-place in the department of Hautes-Pyrénées, France, 3,250 feet above sea-level, in the valley of the Laverdan, 42 miles south-southeast of Pau. The stationary population of the place is only about 1,300, but it is annually swelled in summer by some 20,000 visitors, for whose accommodation numerous sumptuous hotels and bathing-establishments have been built. It is a good centre and guide-station for ascents among the Pyrenees. The sulphurous springs, 25 in number, and varying in temperature from 60° to 131° F., are the most abundant in the Pyrenees (330,000 gallons per day), and have been known from Roman times; though their modern reputation dates from the 16th century, when Margaret, sister of Francis I., held her literary court and wrote much of her 'Heptameron' at Cauterets.

Cautery. See CAUSTIC; ESCHAROTICS.

Cautin, kow'tēn, Chile, a province divided into the departments of Temuco and Imperial. It has an area of 3,127 square miles, and a population of 100,000. The city of Temuco (pop. 9,000) is the capital. Principal towns are: Nueva Imperial (3,000), Lautaro (3,500), and the port of Carahue (2,000). There is a regular line of steamers between Carahue and Valparaiso. In the province are numerous lakes, one of which, Villarica, with a surface of 100 square miles, lies at the base of a volcano of the same name. The Central Railway connects the capital with other cities of the republic. The soil of the province is fertile. Wheat and lumber are produced. The urban property is valued at $7,600,000, and the rural at $16,000,000.

Cautin, kow'tēn, a river in Chile; flows west through a province named after it, and empties into the Pacific Ocean. Its length is about 200 miles.

Cautionary, a term used in Scotch law and signifying the "promise or contract of one, not for himself, but for another." A simple cautioner is one who binds himself conjointly with the debtor or principal for the greater security of the creditor. The creditor may proceed against the principal debtor and cautioner, or against either of them. The cautioner may, however, stipulate on the document constituting the cautionary obligation that the creditor shall take legal measures against the debtor or principal. Cautioners are frequently taken bound, conjunctly and severally, or as full debtors, with the principal, in which case both parties are liable for the whole debt. It follows, from the nature of the obligation, that a cautioner who has paid the debt has an action against the principal for relief. All cautionary obligations must be in writing, and have the signature of the cautioner attached; the conditions of contract must be clearly stated, which must be strictly observed, otherwise the cautioner is freed.

Cautionary Towns, four towns in Holland, Briel, Flushing, Rammekens, and Walcheren, so named because they were given to Queen Elizabeth in 1585 as security for their repaying her for assistance in their struggle with Spain. They were restored to the Dutch Republic by James I. in 1616, although only a portion of the sum advanced was refunded.

Cauvery, kô'vėr ĭ, **Cavery,** or **Káveri,** a river of Hindustan, to the waters of which Mysore and the Carnatic owe much of their agricultural wealth. It rises from several head streams in Coorg and Mysore, near the coast of Malabar, flows southeast through Mysore and the Madras Presidency, and after a winding course of about 470 miles falls into the Bay of Bengal by numerous mouths, the largest being the Coleroon. Where it separates Mysore from Coimbatore the Cavery forms an island called Sivasamudram, near which are two magnificent cataracts, each about 200 feet high, and more or less broken into cascades according to the volume of water. In connection with this river and its tributaries important canals and dams have been constructed for purposes of irrigation, with the effect of rendering the country on either side highly productive. The Cavery is filled by the monsoon rains in May and July, but is not navigable except by small boats.

Cava, kä'vä, Italy, a city in the southern province of Salerno, situated in the valley of Fenestra, three miles northwest of Salerno. It is the seat of a bishop, suffragan to the Pope, and contains a cathedral, three other churches, a convent, a house of refuge, a hospital, and a seminary. Silk, cotton, and linen are manufactured here, and in the numerous small villages that surround the town. The district is extremely unproductive, but the inhabitants have become wealthy by their industry and commerce. About one mile from Cava is the magnificent Benedictine convent of the Trinity, which formerly contained an excellent library, now transferred to Naples. This convent is now national property, and contains a lyceum and boarding-school. Pop. 10,000.

Cavaignac, Jacques Marie Eugène Godefroy, zhäk mä-rē ė-zhăn gō-dŭ-frwä kä-vān-yăk, French politician, son of Louis Eugène Cavaignac (q.v.): b. 22 May 1853. He studied at the Lycée Charlemagne, Lycée Louis le Grand, École Polytechnique, and École des Ponts et Chaussées, interrupting his studies long enough to serve in the Franco-Prussian war. In 1882 he was elected to the Chamber of Deputies, and in 1885 was appointed Under-Secretary of State. In the Panama revelations of 1892 he bore a conspicuous part. On the organization of the Bourgeois cabinet, 30 Oct. 1895, he was appointed Minister of War. In August 1898, he added to the excitement over the Dreyfus prosecution by forcing Lieut.-Col. Henry to confess to a forgery of certain letters bearing on the Dreyfus case, and the accused officer committed suicide within a few hours. In the following month Cavaignac resigned his office. He is author of 'The State and Tariffs of Railroads' (1883); and 'Formation of Contemporary Prussia' (1891).

Cavaignac, Jean Baptiste, zhŏn bäp tēst, French revolutionist: b. Gourdon 1762; d. Brussels 24 March 1829. He became an advocate at the Parliament of Toulouse; and in the National Convention acted as deputy from the department of Haute-Garonne. He rose to be one of the leaders of the Mountain (Extreme Republicans), and, on his various dictatorial missions to

the armies of the Republic, displayed the greatest energy, tact, and incorruptibility. He was a member of the Council of Five Hundred; and afterward became a Councilor of State in Murat's kingdom of Naples. During the Hundred Days he acted as prefect of the Somme. He was banished as a regicide, at the second restoration.

Cavaignac, Louis Eugène, loo-ē ė-zhān, French general: b. Paris 15 Oct. 1802; d. 28 Oct. 1857. His father, Jean Baptiste Cavaignac (q.v.), was a furious revolutionist, and member of the Council of Five Hundred. Young Cavaignac entered the École Polytechnique in 1820, and afterward the military school at Metz, and in 1824 joined the 2d regiment of engineers. He served in the campaign in the Morea, and in 1829 was appointed captain. Being at Arras on the outbreak of the revolution of 1830 he was the first officer in his regiment to declare for the new order of things. In 1832 he was sent to Africa, where he remained for several years, and greatly distinguished himself in defending the French settlement against the Arabs and by his judicious organization of military hospitals, barracks, and works of defense. In 1844 he received the appointment of brigadier-general, with the government of the province of Oran in Algeria.

Cavaignac was in Africa when the revolution of February 1848 took place. In March of that year he was created by the provisional government general of division and governor of Algeria. Shortly afterward the office of minister of war was offered to him, but declined. On 23 April he was chosen representative of the department of Lot in the National Assembly, and proceeding to Paris to take his seat arrived there on 17 May. The capital was then in a state of great excitement from an attempt on the assembly by the Red Republicans two days before. Cavaignac was offered again the portfolio of the minister of war, and this time accepted it. The measures which he adopted to guard against the crisis which was evidently approaching were prompt and decisive. In a few days an army of nearly 30,000 men was assembled in and around Paris, and this precaution was speedily justified by the events which followed. On 23 June, at 11 o'clock A.M., the terrible Communist insurrection burst forth, and for three days Paris presented the most dreadful scene of tumult and bloodshed which had been witnessed there since the massacre of St. Bartholomew. About 15,000 persons perished, and property was destroyed to the value of upward of $1,000,000. By the energy of General Cavaignac, aided by the loyalty of the army and the national guard, the insurrection was suppressed on 26 June. On that day the National Assembly delegated the entire executive power to Cavaignac as dictator, who resigned it again into its hands on the 29th, and received it anew on the same day, with an acknowledgment by the legislative body of the services rendered by him to his country. Notwithstanding these he was defeated in the elections for the presidency in the month of December following, and Louis Napoleon was preferred to the office. On 20 December he resigned his dictatorship. After the *coup d'état* of 2 Dec. 1851, he was arrested and conveyed to the fortress of Ham, but was liberated after about a month's detention. In 1852 and in 1857 he was elected member for Paris of the legislative body, but on both occasions was incapacitated from taking his seat by refusing to take the oath of allegiance to the emperor. The last years of his life were spent at his country-seat in the department of Sarthe. See Montfort, 'Biographie du Général Cavaignac' (1848); Deschamps, 'Life' (1870).

Cavaillé'-Coll, Aristide, ä-rīs-tēd kä-vä-yä-kŏl, French organ builder: b. Montpellier 2 Feb. 1811; d. Paris 13 Oct. 1899. He built the organs in the Parisian churches of St. Sulpice, the Madeleine, etc., and invented the pressure method for sounding tones of different depths and heights.

Cavaillon, kä-vä-yôṅ (ancient CABELLIO), France, a town in the department of Vaucluse, 14 miles southeast of Avignon, on the right bank of the Durance. It is an ancient place, and has a cathedral built between the 10th and 12th centuries. The surrounding district is one vast garden, producing excellent fruit, especially melons and peaches. A considerable trade is carried on in silk, olive-oil, fruit, early vegetables, and wool. The industries comprise straw hats, edge-tools, tanning, currying, the preserving of fruits and vegetables, etc. The Romans had an important colony here, and erected many edifices, of which almost the only remains are some tombs and the fragment of a triumphal arch. It was an episcopal city as early as the 5th century. Pop. 6,000.

Cavalcanti, Guido, gwē dō kä-väl-kän'tē, poet: b. probably in Florence about 1252; d. there 28 or 29 Aug. 1300. He was the friend of Dante, and like him a zealous Ghibelline. When the dissensions of the Guelfs and Ghibellines disturbed the public peace of Florence the citizens banished the chiefs of both parties. The Ghibellines were exiled to Sarzana. On account of the unhealthy air of that place they were permitted to return; but Cavalcanti had contracted a disease of which he died at Florence. In his youth he made a pilgrimage to St. Jago de Compostella in Galicia. Returning home through France he fell in love at Toulouse with a young lady of the name of Mandetta. To her most of his verses which we possess are addressed. They are remarkable, considering the period at which they were written, for their beautiful style. His 'Canzone d'Amore' have gained him the most fame. The learned Cardinal Egidio Colonna and some others have made commentaries on it. His 'Rime,' published by Cicciaporci, appeared at Florence in 1813. See Ercole, 'Guido Cavalcanti e le sue Rime' (1885).

Cavalcaselle, Giovanni Battista, jō vän nē bät tēs'tä kä-väl-kä-sĕl'lā, Italian historian: b. Legnano 22 Jan. 1820; d. Rome November 1897. He became the literary associate of J. A. Crowe (q.v.), with whom he produced the epoch-making 'History of Painting in Italy' (1864–71), the most complete work on the subject; 'Early Flemish Painters' (1857–72); 'Life of Titian' (1877); 'Raphael' (1883).

Cavalier, Jean, zhŏṅ kä-väl-yā, French soldier, chief leader of the Camisards in the wars of the Cevennes: b. Ribaute, near Anduze, 1681; d. Chelsea, England, 17 May 1740. He was at Geneva when the severe measures of Louis XIV. against the fanatical Camisards induced him to return home. Several insurrec-

tions had already broken out, but he soon so distinguished himself by his courage and success, that, though only at the age of 24, he became the acknowledged head of the insurgents. Notwithstanding their gallantry they were obliged to carry on the war on such unequal terms that the impossibility of success became apparent, and Cavalier entered into a capitulation with Marshal Villars, by which he obtained a pension of 1,200 livres, a colonel's commission, and permission to raise a regiment of his own for the king's service. He was summoned, however, to Versailles, and, finding himself looked upon with suspicion, made his escape and soon after visited England. In the Spanish war, being supported by the English and Dutch, he commanded a regiment raised by himself and partly consisting of refugee Camisards, and distinguished himself greatly at the battle of Almanza in 1707, where he was severely wounded. He was afterward pensioned by the British government, appointed governor of Jersey, and made a major-general.

Cavalier, (1) a horse-soldier; an armed horseman; a knight; the name given to the supporters of King Charles I., during the Great Civil war in England, from their gay dress and demeanor, as contrasted with the austerity of the parliamentary party, who were styled Roundheads, from the mode in which the more puritanical of that body wore their hair closely cropped. (2) In fortifications, a kind of interior bastion, several feet more elevated than the principal bastion of the fortress in which it is formed. The use of the cavalier is two-fold: It serves either to defilade the works from the fire of an enemy on an adjacent height, or to command the trenches of the besiegers. Cavaliers are sometimes constructed in the gorges, or on the middle of the curtain, and their form is the semicircular; but when they are within the bastion they are now built with straight faces and flanks parallel to those of the work in which they are placed. French cavaliers are works raised by besiegers on the glacis of a fortress, for the purpose of enabling them to direct a fire of musketry into the covered way.

Cavaliere Servente, kä-vä-lē-ār'ē sėr-vĕn'-tā. See CICISBEO.

Cavalieri, Emilio del, ā-mēl'ē-ō dĕl kä-väl-yā'rē, Italian musician: b. about 1550; d. Florence 1599. He was a Roman nobleman and a pioneer in musical composition, having probably written the first oratorio and the first work akin to the modern opera. His compositions were: 'Soul and Body'; 'Philena's Despair'; etc.

Cavalieri, or **Cavalleri, Francesco Bonaventura,** frän-chĕs'kō bo"nā vän too'rā, Italian mathematician: b. Milan 1598; d. Bologna 3 Dec. 1647. He studied mathematics at Pisa under B. Castelli, a disciple of Galileo, officiated as professor in Bologna, and was author of several mathematical works, the most prominent of which was entitled 'Geometria Indivisibilium continuorum nova quadam ratione promota.' Having expressed in this work some original ideas concerning the abstruse sciences, the Italians claim him to be the inventor of the infinitesimal calculus.

Caval'la. See KINGFISH.

Cavalli, Pietro Francesco, pē-ā'trō frän-chĕs'kō kä-väl'lē, Italian composer: b. Crema about 1600; d. Venice 14 Jan. 1676. He began to write operas in 1637, and continued to produce them for 32 years. Among his works are: 'Xerxes'; 'Jason'; and 'Hercules in Love.' He is now believed to be the inventor of the 'Da Capo,' which was generally attributed to Scarlatti.

Cavallini, Pietro, pē ā'trō kä-väl-lē'nē, Roman painter: fl. in the latter part of the 13th and in the early part of the 14th century. He was the disciple of Giotto, and the first painter of the Roman school who was worthy of competing with the great Florentine masters. His most celebrated work, a picture of the 'Crucifixion,' is at Assisi. Most of his other works are now destroyed.

Cavallo, kä väl'lō, **Tiberius,** Italian physicist and inventor: b. Naples March 1749; d. London December 1809. He early removed to England, where he published, in 1775, a notice of 'Extraordinary Electricity Observed at Islington.' He invented several ingenious instruments for electrical and chemical experiments. His apparatus for measuring the force and quantity of electricity is remarkably delicate and accurate. In 1779 he was admitted to the Royal Society. His study of the influence of air and light on plant-development was brilliantly original, and paved the way for valuable discoveries in organic life. He wrote: 'Medical Electricity' (1780); 'A Treatise on the Nature and Properties of Air, etc.' (1781); 'Complete Treatise on Electricity' (1786); 'Treatise on Magnetism in Theory and Practice' (1787); 'Elements of Natural and Experimental Philosophy' (1803); and other scientific works.

Caval'ly, one of the popular names of *Caranx hippos,* called also horse-crevallé and jack. It is a large and well-known food fish, which occurs abundantly on both coasts of North America, as far south as Cape Cod and the Gulf of California, and also in the East Indies. It belongs to the family *Carangidæ* (q.v.), and is distinguished by having an enlarged tooth on each side of the tip of the lower jaw, and by having the breast naked.

Cavalotti, Felice, fā-lē'chā kä-väl-ōt'tē, Italian statesman and poet: b. Milan 6 Nov. 1842; d. Rome 6 March 1898. He fought under Garibaldi and gained celebrity; was a political journalist. Elected to the Italian parliament (1868), he opposed Crispi and became an extreme Republican. He fought 32 duels, in the last of which he was killed. The most noted of his tragedies are: 'Agnes de Gonzaga'; and 'Alcibiades' (1874). He also published volumes of lyric verse, his best work being 'The Canticle of Canticles.'

Cavalry. Ancient history records many marvelous statements concerning the operations of cavalry. The numbers attributed to the columns of Ghengis Khan and other celebrated raiders seem quite incredible to the modern military student whose ideas are naturally directed to the serious questions of transport and supply. Subsisting mainly upon a species of flour prepared from goat's milk, dried, the idea of a modern commissariat train was not within the range of the wildest dreams of the Tartar hordes, which for centuries roamed over an immense area of Asia and even Europe. Cavalry was used for many centuries before the

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Christian era and proved its value in many historic campaigns. Alexander the Great developed his cavalry to a considerable degree of excellence and used it in large bodies with marked success. The Romans made effective use of cavalry, but depended almost entirely upon auxiliaries for recruiting that important branch of their armies. Saddles had not come into use during all this early period of military history and all cavalry then existing must of necessity be classed as light or irregular.

During the Middle Ages, military power was quite generally dependent upon the good will of and exercised through the nobility or chiefs of clans. The use of heavy armor, battle axes, and powerful two-handed swords, demanded strong saddles and large horses. The feudal system was gradually developed and spread over Europe and the British Isles. The fighting was done by the knights and esquires, mounted, while the peasant retainers armed with pikes and crossbows, constituted groups of footmen, who frequently operated in campaigns of considerable duration, but were not armies in the modern sense of the term.

The invention of gunpowder was responsible for a revolution in military methods, and the changes were particularly noticeable in the mounted contingents. The long-continued efforts to make mounted infantry and dragoons efficient while the state of firearms was yet quite primitive, resulted only in discrediting the horsemen. The value of armor was much decreased through the introduction of gunpowder, but its use in some forms continues even in this utilitarian age and generation. The lance has been periodically lauded and discredited. At various times in the world's history it has won high praise through great performance on the field of battle. It has been restored, recently, to full favor in some of the most highly trained and effective armies of modern times, yet no serious test by armies has been made of it since the days of Napoleon. A few charges here and there during a century do not constitute a service test of any weapon. The influence of improvements in weapons is generally seen in modifications of tactics and drill regulations. From this cause may be traced the modification in the orders of battle, which, in various periods of history have required that cavalry should engage in formations ranging from one to six or more ranks in depth. The Americans abandoned the double-rank formation for cavalry as a result of the experience of the Civil War, when nearly 300,000 mounted men, exclusive of mounted infantry, were in the opposing armies. The history of cavalry and its gradual evolution from the hordes of barbarian horsemen of ancient times, down to the modern regiments of lancers or dragoons, covers a vast field which cannot be sketched in a brief essay. The development of the American type of cavalry during the past half century is an interesting and profitable study because of the position now occupied by the United States in the world's affairs.

Until the reorganization of the United States Army in 1901 the proportion of the various arms was always determined through the expediency of the moment rather than upon any well-considered general plan. During the Revolutionary struggle, the early Indian wars, the War of 1812, and, in fact, until the discouragement of constant failure in 1833 to 1836 demanded a change of policy, the mounted service of the army was almost wholly performed by militia or volunteers. The absence of a properly organized contingent of cavalry during the Revolution enabled the young and energetic Tarleton to ride with his small force of dragoons almost at will through the southern Colonies. All the early Indian wars were treated as spasmodic outbreaks demanding temporary application of force, but requiring no provision for the future. The War of 1812 contained much discouragement, but its history records several marked incidents to prove the value of trained troops and the urgent need in a Republic of an organized body to keep alive a knowledge of military art and improvements applicable to warfare. The experience was ignored, however, and it was not until 1821 that a reorganization of the army was undertaken and then the cavalry was left out entirely. During the Black Hawk war a battalion of mounted rangers was called into service and was merged the following year (1833) into the new regiment of mounted troops, the First Dragoons, which constituted the first permanent cavalry regiment of the United States Army. The Second Dragoons was organized in 1836 especially for service in the Seminole war and the valuable services rendered, together with the increasing needs of protection for the Southwestern frontier prevented the disbandment of this fine regiment. These two regiments of dragoons constituted the entire mounted force of a permanent character in service prior to the Mexican war. During this war the regiment of Mounted Rifles was organized and, although it fought as infantry for a time, it was reorganized as a mounted regiment at the close of the war and has continued in service since that time. The acquisition of California and other territory, the discovery of gold, followed by unprecedented immigration through and across the Indian country, demanded a further increase of the army, and in 1855 Congress authorized two regiments, the First and Second Cavalry, which were organized and sent at once to duty upon the Western frontier. Encroachments upon Indian lands and the ever-increasing tide of emigration flowing constantly beyond the border settlements caused incessant conflict with Indian tribes scattered from British Columbia to the Mexican boundary, and from the Missouri River to the Pacific Ocean. With scant necessities and no luxuries in post or field these fine regiments so impressed themselves upon the Indian tribes with whom they came in conflict that the punitive lessons were of untold value when the Civil War caused a general withdrawal of the regular troops from the frontiers. During all the period from their organization until 1861 the regiments had retained their designations of Dragoons, Mounted Rifles, and Cavalry. The drill regulations in vogue during this period were adapted from those in use by the French army and while they now appear somewhat cumbersome, they served well their purpose. These regiments were very efficient mounted organizations and were the schools wherein were trained many of the most successful generals of the Civil War. Their gallantry was attested on many fields in the Florida war, the Mexican war, and upon the great plains of the West. They uncomplainingly endured untold hardships

by flood and field, especially in the Utah campaign, and fixed a composite type of cavalry upon which all were reorganized in 1861, and which served as a model for the organization of the 272 regiments of cavalry mustered into service during the Civil War.

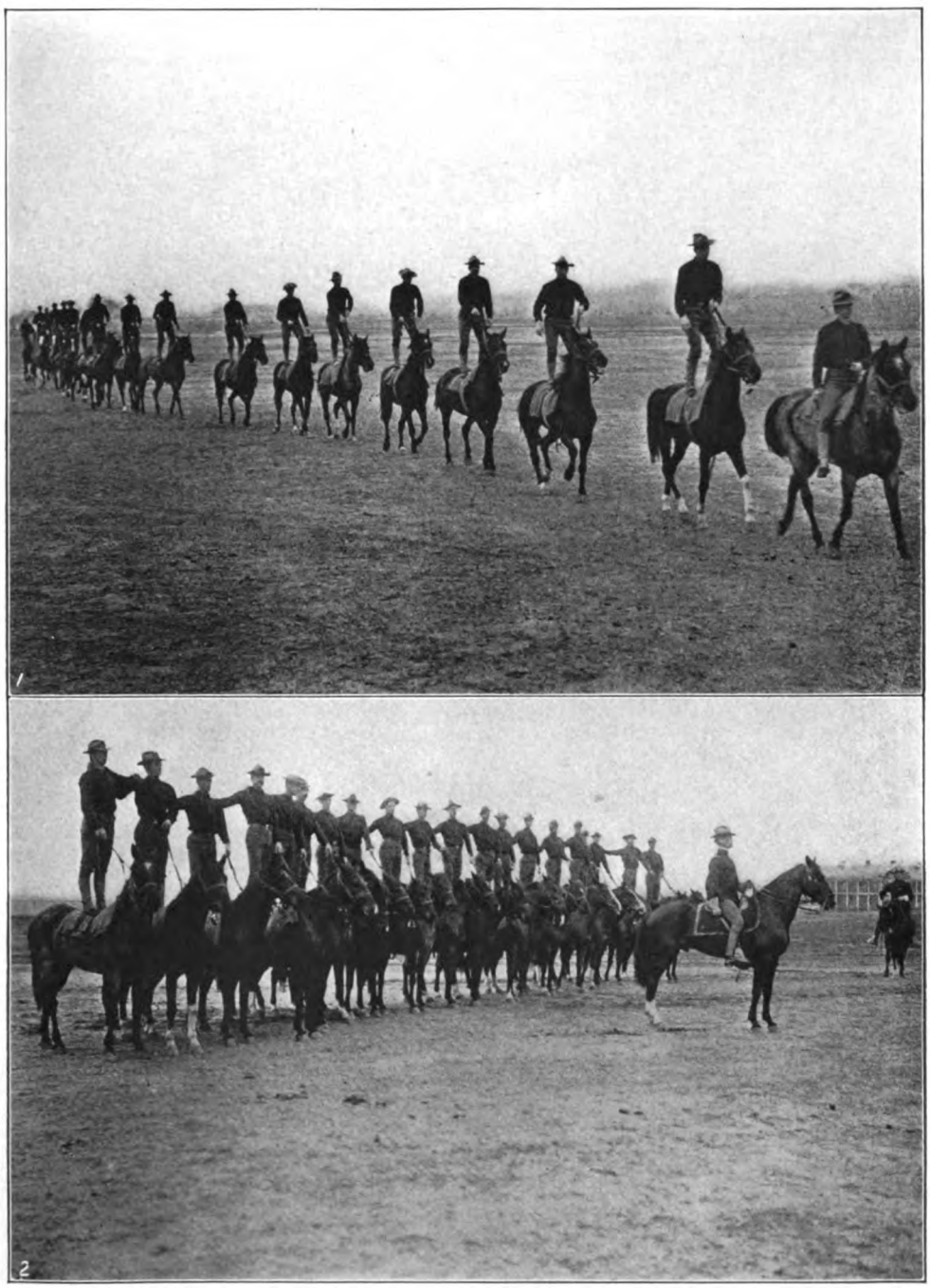
In 1861 Congress authorized the organization of the Third regiment of cavalry, but immediately after abolished the terms dragoons and mounted rifles, and designated all the regiments as cavalry, giving them numerical designations in the order of their original organization. It was not, however, until 1862 that the old regiments were given the same organization as the new regiment. Prior to this time the regiments were organized on the European model of five squadrons of two troops each. Both the regular and volunteer regiments were organized with 12 troops each and the tactical organization of squadrons of two troops each was continued. The dragoons had secured a high place upon the roll of honor through their gallantry and dash in the Mexican war, and all the regiments had emerged from the period of Indian conflicts with justifiable pride. All experience previous to the Civil War had been limited to meeting emergencies arising in dealing with cunning and relentless savages. A new field of action was now presented when the necessity arose for the organization of larger tactical bodies of cavalry than had ever before been required in this country. Millions were expended in putting into service volunteer cavalry regiments under the prevailing idea that patriotism made invincible soldiers. Much discouragement and an enormous waste of public funds resulted. It was only after a year or two of experience and a thorough weeding out that the Union cavalry became worthy of the reputation which quickly came in the wake of its great successes. The Confederate cavalry was composed entirely of those who could supply their own mounts. This drew to that arm a class of young men accustomed to horseback riding from infancy and usually possessed of a knowledge of firearms. This gave them a great advantage over their opponents, which they maintained during all the early period of the Civil War. Inability to supply themselves with remounts, together with the gradual improvement of the Union cavalry brought about a change, and during the last two years of the War the services of the cavalry under Sheridan, Wilson, and other gallant leaders, placed upon the pages of history a continuous record of victories. Operations which became known by the generally accepted title of raids, were conducted by both armies. Legitimate raids, carefully planned and executed with celerity and decision have become recognized as valuable adjuncts of the operations of armies. A large number of so-called raids during the Civil War, on both sides, were demanded by no military necessity, and resulted in excessive losses of horses without coresponding benefits to the general plan of operations.

Throughout the Civil War the question of supplying the cavalry with horses was a very serious one. The waste of animals due to ignorance was great, but the widely extended field of operations, the difficulty of supplying forage, the improper use of cavalry, and the continuous fatigue incident to raids placed strains upon the powers of endurance of the horses which few could withstand.

Deaths due to wounds received in battle constitute but an insignificant part of the losses of cavalry horses in war. It was with a view to both increased economy and efficiency that after a war experience of two years a cavalry bureau was established. An enormous number of horses broken down through excessive marching and fatigue were turned in at the several depots and recuperated sufficiently to be again issued. This was but a fraction of the whole number supplied, owing to the difficulty of returning worn-out horses from distant and isolated points. Some idea of war losses may be had from the statement that there were purchased during the fiscal year ending 30 June 1864, 188,718 horses. During the first eight months the cavalry of the Army of the Potomac was supplied with two complete remounts which required 40,000 horses. The total number of horses and mules required to keep up the supply was 500 a day, and the data collected showed that for every two men of the whole army one animal was required in the ranks or trains. The recent experience of the British army in South Africa indicates that the loss of animals in the Civil War was not exceptional and that whenever campaigns are undertaken in a sparsely settled country history will repeat itself.

The organization, equipment, and methods of employment of cavalry in the Civil War gradually became quite uniform and have since been clearly recognized as the American system. The cavalry was armed with breech-loading magazine carbines, while the infantry continued to the end of the war to use the muzzle-loading rifle. This accounted for the superiority of fire action whenever the cavalry fought dismounted. There was no inclination to avoid mounted fighting with sabre or pistol whenever cavalry was opposed by cavalry on suitable ground, but the most efficient fighting, and that which gave the best results was accomplished by dismounted fire action. The regiments were uniformly armed with breech-loading carbine, pistol, and sabre. The horse equipment consisted of a McClellan saddle-tree covered with rawhide, a saddle blanket, a pair of small saddle-bags, halter and bridle with single rein and curb bit. The arms and equiment have continued to find favor and remain the same in name, but modernized and improved to the highest known standard. There is no stagnation in such matters and experimentation is continually going on with a view to improvement. At the present time (1903) the improved saddle-tree is covered with stuffed russet leather and the saddle-bags are much larger than those formerly used, a change brought about by the necessities of frontier service subsequent to the Civil War. The new carbine will be second to none in the world in the essentials of penetration and trajectory.

The present organization of the cavalry regiments is the same as that adopted in 1862 except that a squadron now comprises four troops instead of two. This makes the number of squadrons in each regiment three, which corresponds with the number of majors and admits of treating the squadron both as an administrative and tactical unit. The number of regular regiments continued at six throughout the Civil War, but was increased to 10 in 1866, because of the requirements of protection for the frontier. As the Indian lands became circumscribed by the settlements, some of the regiments were with-



UNITED STATES CAVALRY EXERCISES.

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drawn from the frontiers and larger garrisons were established with a view to better instruction. The school of practice which existed during the continuance of Indian hostilities could not well be improved upon as a means of development of self-reliance, woodcraft, and the ability to care for one's self generally in the field. The cessation of savage warfare made it necessary to devise schemes of instruction, having for their object the training of the younger generation of soldiers in campaign duties. Although the American cavalry has not been tested in mounted combat with the cavalry of any of the great military powers of modern Europe, it has proved its efficiency and worth upon many fields. During the Santiago campaign of 1898, in the island of Cuba, owing to insufficient transports, the regular cavalry division participated dismounted. The regiments performed every duty required of the infantry and sustained the reputation for gallantry and efficiency won upon many previous fields of the Civil and Indian wars. The same degree of success has followed the cavalry operations in China and the Philippines. Complete success was lacking in the operations against the Philippine insurgents until a cavalry brigade, provided with pack mules for transporation of rations, was put in the field. It then became possible to follow up the insurgent army, which rapidly fell to pieces and began the guerrilla warfare, which characterized the later days of the insurrection. The continuance of the insurgent warfare, together with the conditions existing in China, made it necessary to reorganize the United States army and by an increase of its personnel to make practicable the release from active service of about 35,000 volunteers who had been enlisted and sent across the seas at great expense.

In undertaking this reorganization, the experience of the past 50 years was carefully studied and many changes introduced, although as a matter both of expediency and compromise many desirable reforms were omitted. Notwithstanding the prevailing political prejudices against modification of the military system, there is no more conservative institution in all America than the regular army of the United States. In determining upon the organization of the cavalry, and of the field artillery also, it was recognized that the organized national guard of the country is composed almost wholly of infantry. The expense of mounted troops is very great and it is quite certain that at the outbreak of war of any magnitude, no reliance could be placed upon volunteer cavalry for mounted action within a less period than one year. Under the last reorganization of the army, a cavalry force of 15 regiments was provided. The American regiment is composed of three squadrons of four troops each, with a minimum number of 65 and a war strength of 100 men to each troop. The European and British cavalry still retain the small squadron of two troops and with four or five squadrons to each regiment. The American cavalry squadron with ranks completely filled to war strength, would be somewhat unwieldy, but the numbers have been fixed as the result of much experience, all of which tends to prove that troops in barracks never march to the field with full ranks, and that after a brief campaign the numbers become still further reduced through weeding out of unfit men and horses. Every effort is made to perfect the organization and equipment, but some of the most pronounced lessons of the Civil War are still neglected. The recently authorized general staff corps is regarded as the means through which our past and future military experiences will be profitably studied and the results made available for practical application in the regular and volunteer armies, which, under the laws of the country, constitute, in time of war, the «Army of the United States.»

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Cav'an, Ireland, a county in the province of Ulster, having Fermanagh on the north, Leitrim on the west, and Longford and Westmeath on the south; area, 746 square miles. In the northwestern part is a range of hills called the Ballymageeragh Mountains, but the remaining surface, which is undulating and irregular, is pervaded by bog and interspersed with many fine lakes. The chief rivers are the Erne, the Woodford, the Blackwater, and the Annalee, and the chief lakes Lough Ramor, Lough Sheelin, Lough Gowna, Lough Oughter, and Upper Lough Erne. Much of the soil of this county is cold, spongy, and inclined to be rushy. The chief cereal crop is oats, the chief green crop potatoes. Wheat is little cultivated; flax is raised to some extent, and the high lands are good for grazing. Linen-bleaching and the distilling of whiskey are the chief industries. The principal towns are Caven, Cootehill, and Belturbet. Pop. (1901) 97,368.

Cavan, Ireland, a town, capital and chief business centre of the above county, 57 miles northwest of Dublin. There are churches for the Episcopalians, Roman Catholics, Methodists, and Presbyterians, an endowed school founded by Charles I., municipal and county offices, jail, union workhouse, a court-house, an infirmary, a fever hospital, and a Roman Catholic college. Pop. 3,000.

Cavanilles, Antonio José, än-tō-nē'ō hō sā' kä-vä-nēl'yĕs, Spanish clergyman and botanist: b. Valencia 1745; d. Madrid 1804. In 1777 he went to Paris and remained there 12 years, occupied with the study of several sciences, but chiefly with botany. He published there, in 1784, 'Observations on the Article Spain in the New Encyclopedia,' written with as much patriotism as profound reasoning. In the following year he commenced his great botanical work, 'Monadelphiæ Classis Dissertationes decem' (Paris 1785–9; Madrid 1790, 4to, with engravings). After his return to Spain he wrote 'Icones et Descriptiones Plantarum, quæ aut sponte in Hispania crescunt aut in Hortis hospitantur' (1791–9, 6 vols. folio, with 601 engravings). It contains a number of new genera and species, natives of Spain, America, India, and New Holland. In pursuance of a commission from the king, Cavanilles traveled in Valencia, and collected the materials for his 'Observaciones sobre la Historia Natural, Geografia, Agricultura, Poblacion, etc., del Reyno de Valencia' (1795–7, 2 vols. folio, with copperplates from the drawings of the author). The work was published at the expense of the king, and intended as the first part of a similar work to embrace the whole of Spain. Thunberg has named a family of plants Cavanilla.

Cavatina, kăv-a-tē'na, in music, a short operatic air without a return or second part, sometimes relieved with recitative, but now extended to the aria generally, especially if the character of expression is tender, hopeful, or joyous. In this elegant and gracefully melodic class of composition the Italians naturally eclipse all other musicians; yet the *Il mio Tesoro* of Mozart will bear comparison with the finest cavatinas ever written.

Cave, Edward, English printer, founder of the 'Gentleman's Magazine': b. Newton, Warwickshire, 27 Feb. 1691; d. London 10 Jan. 1754. His first occupation was that of clerk to a collector of the excise in the country. He then went to London, and put himself apprentice to a printer. When his indentures expired he obtained a place in the post-office, and employed his leisure in writing for the newspapers. He published in January 1731 the first number of the 'Gentleman's Magazine,' which, under a considerably modified form, has continued till this day. Cave was deprived of his place in the post-office on account of his having resisted some abuses relative to the privilege of franking letters. During his last illness Dr. Johnson (who subsequently wrote his life) was often an attendant by his bedside.

Cave, Henry William, English artist and traveler: b. Brackley, Northamptonshire, 1854. He was educated at Queen's College, Oxford, and in 1877 founded the commercial establishment of Cave & Company at Colombo, retiring in 1887. He has published 'Colombo and the Kelani Valley' (1893); 'Kandy and Peradeniya' (1894); 'Nuwara Eliya and Adam's Peak' (1895); 'The Ruined Cities of Ceylon' (1897); 'Golden Tips,' a description of Ceylon' (1900).

Cave, or **Cavern,** an opening produced by nature in the solid crust of the earth. Caves are principally met with in limestone rocks, in gypsum, sometimes in sandstone, and in volcanic rocks (basalt, lava, tufa, etc.). The form of the caves depends partly upon the nature of the substance in which they exist; but it is frequently altered by external causes. Out of some caverns rivers take their course; others again admit rivers, or may be said to swallow them for a space. There are many and various causes for the formation of caves. Those in limestone and gypsum are unquestionably the results of the dissolving power of water; in fact the almost perfectly uniform direction, the gentle and equable declivity of most caves, appear to be the effect of the long continuance of water in them, the action of which has widened the existing crevices. In trachyte and lava, caves appear to have been produced by the effects of gas. The caves of gypsum often contain foul air; the caves of limestone, various figures of stalactites, produced by the deposit of the lime dissolved in the water. Many of these lime caves contain remnants of bones of animals, such as hyænas, elephants, and bears. See CAVE-DWELLERS.

Many caves are remarkable only on account of their great size, or sublime from the awful gloom which pervades them, and the echoes which roll like thunder through their vaulted passages. Some are of great depth, as that of Frederikshall, Norway, which is calculated to be 11,000 feet in depth. One of the grandest natural caverns known is Fingal's Cave (q.v.) in Staffa, one of the Western Islands of Scotland. Its sides are formed of ranges of basaltic columns, which are almost as regular as hewn stone. The grotto of Antiparos, on the island of the same name, in the Grecian Archipelago, is celebrated for its magnificence. The roof is adorned with stalactites, many of them 20 feet long, and hung with festoons of various forms and brilliant appearance. In some parts immense columns descend to the floor; others present the appearance of trees and brooks turned to marble. The Peak Cavern in Derbyshire, England, is a celebrated curiosity of this kind. It is nearly half a mile in length; and, at its lowest part, 600 feet below the surface. Other famous stalactitic caves are the Luray Cavern (q.v.), Page County, Va.; one near Matanzas, Cuba; one near Adelsberg, Carniola; the Wyandotte Cave (q.v.), Crawford County, Ind.; and Madison's Cave, in Rockingham County, Va. The caves of Kirkdale, in England, and Gailenreuth, in Germany, are remarkable for the quantities of bones of the elephant, rhinoceros, and hyæna found in them. In the rock of Gibraltar there are a number of stalactitic caverns, of which the principal is St. Michael's Cave, 1,000 feet above the sea. Other celebrated caves in America are Weyer's Cave, in Augusta County, Va., extending 800 yards, but extremely irregular; the Colossal Cavern, Ky. (q.v.), discovered in 1895, and the Mammoth Cave (q.v.) in Edmondson County, Ky., which encloses an extent of about 150 miles of subterraneous windings. One of its chambers, called the Temple, covers a space of nearly five acres, and is surmounted by a dome of solid rock 120 feet in height. The Cumberland Mountains, in Tennessee, contain some curious caverns, in one of which, at a depth of 400 feet, a stream was found with a current sufficiently powerful to turn a mill. Another cave in the same State is named Big Bone Cave, from the bones of the mastodon which have there been discovered. In the Raccoon Mountains, near the northwestern extremity of Georgia, is Nickojack Cave, 50 feet high and 100 feet wide, which has been explored to the distance of three miles. A stream of considerable size, which is interrupted by a fall, runs through it. Caves are sometimes found which exhale poisonous vapors. The most remarkable known is the Grotto del Cane, a small cave near Naples. In Iceland and Hawaii there are many caves formed by the lava from volcanoes. In the volcanic country near Rome there are many natural cavities of great extent and coolness, which are sometimes resorted to as a refuge from the heat. In South America is the cavern of Guacharo, which is said to extend for leagues. For information concerning human and animal remains in caves, see CAVE-DWELLERS.

Cave Animals, or **Cave Fauna,** an assemblage of animals of different classes which are blind and either totally or partially eyeless.

Distribution of Cave-Regions.— In the United States the caves containing permanent inhabitants are situated south of the former region of glaciers, that is, in Mammoth and adjoining caves in Kentucky; Wyandotte and smaller caves in Indiana; caves in Carter County, Ky., and Weyer's and the Luray caverns in Virginia. These regions have been honey-

combed by the action of subterranean streams now dried up. With these systems of subterranean drainage are associated sink-holes, and deep, dark wells inhabited by blind fish, crayfish, and other crustaceans of the same species as those inhabiting the caves. Other caves more or less tenanted by blind forms are situated in Mexico, in open sink-holes in Cuba, as well as in caves and wells in New Zealand. Rich cave faunæ are found in southern France, and in limestone deposits near or at the base of the Pyrennes, though the great grotto of Adelsberg, near Trieste, is the classic abode of cavernicolous forms, including the blind triton, eyeless beetles, etc.

Mammoth Cave (q.v.) is the type of a great system of underground passages and chambers where these blind animals live. The total length of its avenues is about 150 miles. In the older and dry passages and chambers there is little life; the animals are mostly found in the newer and damp places, the aquatic forms living in the streams and pools. There is no vegetation except a few scattered molds and fungi. The food is scanty, and the animals are carnivorous, preying on one another. The temperature is very equable, the mean for the winter months being 53° F., and for the summer 54° F. The number of species thus far detected in Mammoth Cave is about 75, and in other American caves about 40 or 50 more, while several hundred kinds exist in European caverns.

Blind Fishes.— The most striking and interesting form in Mammoth Cave is the blind-fish (*Amblyopsis spelæus*). It is about four inches long, colorless, and blind, the eyes being vestigial. This fish seeks the dark and shuns the light, being much disturbed by a lighted match or bright sunlight, or even by a ray of light. In well-fed adult specimens there is no external indication of an eye; but in young ones, before reaching a length of two inches, the eyes can be distinctly seen, owing to their pigment, which is lost in the adult. The optic nerve can be traced in examples under an inch in length, but in large specimens the nerve to the brain cannot be followed. The lens is much reduced, and, in fact, the vestiges of the eyes are exceedingly variable. This will apply to the eyes of other blind fishes and blind insects, crustacea, etc. While the sense of sight is lost, that of touch in the blind-fish, as in most other cave animals, is exalted. *Amblyopsis* is provided with tactile papillæ, arranged in ridges on the front and sides of the head. Though the ears of this blind-fish are said by some authorities to be largely developed, others state that they manifest total indifference to light and sound. They are said to show extreme timidity and caution in their movements.

Blind Salamanders.— A still higher type of vertebrate, two species of salamanders have become adapted to cave life, losing their eyesight by disuse. The species of the genus *Spelerpes* frequent damp, dark situations and the entrances to caves. An allied form (*Typhlotriton spelæus*) is distinctly a cavernicolous as distinguished from a twilight species, and has never been found outside of caves. Its eyes show early stages of degeneration. It inhabits caves in southwestern Missouri, and occurs under rocks in and out of water. Still another salamander, whose eyes are the most degenerate known among amphibians, is the *Typhlomolge rathbuni*. It lives in subterranean streams, tapped by an artesian and also a surface well, near San Marcos, Texas, and likewise occurs in one of the caves near that town. Its remarkably long and slender legs are too weak to support its body when out of water. The eyes of this salamander are in many respects much more degenerate than those of the *Proteus* of Austrian caves.

The lower animals tell the same story of degeneration, blindness and total or partial atrophy of the eye, together with loss of color, and, in a more striking way, the compensation for the loss of vision by a great increase in length of the antennæ and other appendages, or the growth of long, slender tactile bristles.

Blind Crayfish and Other Crustacea.— The blind crayfish (*Orconectes pellucidus*) is a common cave form. It differs from its out-of-door allies in being blind, slender-bodied and colorless. The eyes are present, but they are much reduced in size, and destitute of a cornea and of black pigment, while the colorless body is slender. It is not only blind, but deaf, and exceedingly timid and cautious in its movements. Other blind or eyeless crustaceans are various kinds of amphipods and isopods, both aquatic and terrestrial, of which species of *Cæcidotea*, allied to the *Asellus*, a common crustacean of fresh waters, are the most abundant, and form the food-supply of the blind crayfish.

Blind Insects.— The eyeless beetles of caves (*Anophthalmi*) have no vestige of eye or of optic nerves and ganglia, while their bodies and appendages are slender. They grope their way about by means of very long tactile bristles. Other beetles, such as *Adelops*, which have retained vestiges of the outer eye; some spiders comprising an eyeless species, and others with eyes varying in size, some much reduced, spin little webs on the walls of the chambers. Among the harvestmen some (*Phalangodes*) have extraordinarily long legs; while the *Campodea* (q.v.), a wingless insect of the Mammoth and other caves of the United States and Europe, differs from the outdoor form in its antennæ and abdominal appendages, being greatly exaggerated in length. There are also mites, myriapods, primitive wingless insects (*Podurans*), a few flies, worms, and infusorians.

Origin and History.— The fauna of caves is evidently composed of the descendants of individuals which have been carried by various means into the subterranean passages, have become adapted to life in perpetual darkness, becoming isolated, and thus, as long as they are subjected to their peculiar environment, breed true to their species, and show no tendency to relapse to their originally eyed condition. The absence of the stimulus of light causes the eyes, through disuse, to undergo reduction and atrophy. With this goes, in certain forms, the loss of the optic ganglia and optic nerves. I have found and stated the following effects of disuse in the invertebrate animals of Mammoth and other caves, and from these statements it will be realized how profoundly the organisms have been modified:

1. Total atrophy of optic lobes and optic nerves, with or without the persistence in part of the pigment or retina and the crystalline lens (certain *Crustacea*, harvestmen, *Adelops*, beetle, and the myriapod *Pseudotremia*).

2. Persistence of the optic lobes and optic nerves, but total atrophy of the rods and cones, retina (pigment), and facets (blind crayfish).

3. Total atrophy of the optic lobes, optic nerves, and all the optic elements, including rods and cones, retina (pigment) and facets (*Anophthalmus* beetle, and the myriapod *Scoterpes*).

An interesting fact, confirmatory of the theory of occasional rapid evolution, as opposed to invariably slow action involved in pure Darwinism, is that we never find any vestiges of the optic lobes or optic nerves; if they are wanting at all, they are totally abolished.

Compensations for Loss of Eyesight.— On the other hand, certain other parts of the body, as the result of use, become extraordinarily developed; such are the tactile papillæ of the blind-fish, the greatly lengthened feelers and legs, the long, delicate tactile hairs of various *Crustacea* and insects. It is plainly the case that the enhanced development of these organs is the result of frequent use of exercise. There is no need of invoking natural selection, these parts developing as the direct result of the change of habits, of the new needs of the animals to feel their way about, forced to adopt such habits by the abnormal conditions of their existence. Although the animals are members of very different groups, inheriting very different structures and habits, yet all genuine cave animals resemble each other in being pale, and ghost-like, in the exaltation of the tactile sense, and the corresponding increase in length and delicacy of the extremities.

Theories of the Origin of Cave Forms.— Darwin attributed the loss of eyes to disuse, stating that natural selection was not operative. Packard stated the view that the loss of eyes was attributable to the Lamarckian facts of change of environment, and consequent disuse, isolation, and use-inheritance. The latest author, Eigenmann, concludes that the Lamarckian view — that through disuse the organ is diminished during the life of the individual, in part at least on account of the diminution of the amount of blood going to a resting organ, and that this effect is transmitted to succeeding generations — not only would theoretically account for unlimited progressive degeneration, but is the only view so far examined that does not on the face of it present serious objections.

An underground laboratory for the study of cave animals has been established by M. Viré in the old catacombs and underground quarries extending under the Jardin des Plantes in Paris. Here are all the conditions of a cave, namely, perpetual darkness, an unvarying temperature, and running water for aquatic forms. M. Viré has introduced various blind and eyed species, and eventually we may expect to have much light thrown on the interesting problems suggested by such studies as these. Great activity has been shown in France in the exploration of the caves and subterranean streams of the Midi; and a Société de Spéléogie has been organized for several years.

Consult: A. S. Packard, 'The Cave Fauna of North America'; 'Memoirs of the National Academy of Sciences' (Vol. VI.); C. H. Eigenmann, 'The Eyes of the Blind Vertebrates of North America' (Archiv Entwickelungsmechaniks der Organismen, Vol. VIII.); and other papers. Consult also the writings of Tellkampf, Schiödte, Cope, Putnam, Garman, Henshaw, Joseph, Chilton, and others.

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Cave-bear, an extinct species of European bear closely allied to the living grizzly, but attaining a larger size. Its remains are found in bone-beds in caverns, whence the name. The habits of the animal were probably not different from those of modern bears. The cave-bear of South America is a different animal (see ARCTOTHERIUM). Both species are found in the larger caverns of North and South America.

Cave-dwellers, prehistoric men dwelling in caves, and cave-dwelling animals of corresponding periods; also cave-dwelling men of more recent historic times. Long before the dawn of authentic history, primitive races of men dwelt in large numbers in natural caverns, which were often shaped, enlarged, fortified, or furnished by the occupants. The ages in which the prehistoric cave-dwellers lived are usually called the Palæolithic, or Ancient Stone Age, and the Neolithic, or Later Stone Age. Many caves have been explored in England, France, Belgium, Spain, America, and Australia; notably a famous cave known as Kent's Hole, in Devonshire, England, caves at Brixham and Périgord, and the Madeleine Cave on the Vezère River, France. In the Neolithic Age numerous human skeletons are found, but very few in the earlier age. It is believed that some of these human remains possibly antedate the glacial drift period of Europe. The remains found in the caves are ordinarily overlaid with deposits of varying thickness and different qualities. In Kent's Hole, near Torquay, there were found four distinct strata of deposits overlying the cavern floor: the surface layer a dark earth containing Neolithic and Roman remains, the second layer a thin stalagmite floor, the third a stratum of red earth containing flint implements and bones of animals, and the lowest deposit consituting a hard breccia, in which human and animal remains of a ruder and earlier period were found.

Caves in which the bones of extinct animals are found owe their origin, for the most part, to the action of rain-water on limestone rocks, in which they most frequently occur. The deposit contained in these caverns usually consists of clay, sand, and gravel combined. In this deposit are imbedded remains of animals, and stones either angular or rounded. The bones scarcely ever occur in entire skeletons, but are scattered in such a way as to show that they must have been moved from their places subsequent to the death of the animals. They seldom, however, have suffered much from friction; and at times look so fresh that, but for the complete abstraction of the animal matter which they must have originally contained, they might be supposed to have been brought into the cavern a few weeks before. The most remarkable fact with regard to these bones is that the most of them belong to animals which do not now exist at all, or exist only in regions far remote from those where caverns occur. Some of those found in European caverns belong to animals now found only in the tropical or sub-tropical regions, and others are the re-

mains of animals now living in more northerly areas, while others, although evidently molded on types similar to those of existing animals, differ from them in several essential features. To add to the difficulty of explanation, human bones have repeatedly been found mingled with those of the lower animals. The evidence of the cave remains proves the co-existence of man with animals not now living in the same areas; of these animals some are now extinct, as the cave-bear (q.v.) and cave-lion, the mammoth, and mastodon, the tichorhine rhinoceros, etc.; others have only migrated. Thus the reindeer is no longer found in southern Europe; the *Hyæna crocuta,* found in the Gibraltar caves, now lives in South Africa. The ibex, the chamois, and a species of ground-squirrel, once lived in the Dordogne, but are now found only on the heights of the Alps and Pyrenees. Thus it is evident that a considerable change of climate has taken place in Europe. Man's relation to these extinct animals, and his existence at the time these changes took place, are demonstrated by the discovery in the caves of human bones and worked flints beneath layers of hyæna droppings, as in Wokey's Hole, near Wells; mixed up indiscriminately, as in Kent's Hole, with bones of elephant, rhinoceros, hyæna, etc.; and by the fact that many bones of the extinct animals are split up, evidently for the sake of the marrow. In the Dordogne and Savigné caves fragments of horn have been found bearing carved — or, rather, deeply scratched — outline figures of ibex, reindeer, and mammoth. The bones of the reindeer are found in large numbers, some of them showing that the flesh had probably been cooked. It is believed that this animal was a chief article of food with the cave-dwellers. Implements of flint and stone are mingled with the remains. Among the non-extinct animals known to have dwelt in the caves with men, or to have been carried there for food, or to furnish their skins for clothing, are the mammoth, musk-ox, horse, dog, bison, rhinoceros, and hyæna. In 1820 Dr. Buckland explored a cave at Kirkdale, in Yorkshire, England, and proved that it had been inhabited by great numbers of hyænas that had dragged into it many other animals. Among the remains found in Europe nothing has been shown to indicate that the cave-dwellers domesticated any animals, or used them for anything but food and clothing. Needles of ivory are found, leading to the inference that they knew how to sew skins together for garments. No traces of agriculture, and no implements used in agriculture, have been discovered. Lance-heads, arrow-heads, hammers, saws made of flint, and harpoons, have been found. The great number of fish-bones found, showing marks of cookery, indicates that they engaged in fishing extensively, but the variety of bird remains indicates their inferior skill in catching or killing winged creatures. They probably had no spinning implements and did not know the art of pottery.

In the cave of Cro-Magnon in the south of France skeletons were found that are accepted by palæontologists as those of genuine cave-men. Taking them as the type, it is inferred that the Palæolithic cave-dwellers were a tall, powerfully built race, with long narrow skulls, broad faces, and powerful jaws. Investigations in the Belgian caves seem to indicate that the cave-men of that region were of much smaller stature, but with symmetrical, well-shaped bodies. The traces of the most ancient cave-men found in Europe are believed to identify them ethnically with the Esquimau. The bone needles, harpoons, arrow- and spear-heads, and scrapers, are much like those of the Esquimaux. The designs of their carvings also are much the same, as well as their habit of accumulating piles of bones around their dwellings, which they were accustomed to split for the marrow. The habitat of animals now common in the Arctic region, where the Esquimaux live, has shifted to the north, and their migration has been traced with the subsidence of climates, from Europe to the regions where the species that have survived now live. It is believed that the Esquimau in the same way is the descendant of the Palæolithic cave-dweller, who has gradually receded to the north.

The caves belonging to the Neolithic Age yield remains classified into three ages: Neolithic (proper), Bronze, and Iron. They are widely distributed throughout Europe, and contain celts, flints, flakes, rude pottery, bones of the pig, dog, horse, sheep, and goat, with those of many wild animals still indigenous in Europe, and of some that are extinct, and many human skeletons. The latter show that the people populated the caves in great numbers. They were a race of short-statured people having common resemblances in various regions of Europe. They were in some regions cannibals, and slightly in advance of the Palæolithic races in the variety of their implements and occupations. Their gradual progress down to the dawn of history is shown by the substitution of bronze, and then of iron, in place of the stone of earlier ages for implements and weapons.

In America, caves with human remains have been investigated in Brazil, Ohio, Kentucky, Minnesota, Arizona, Colorado, Nevada, Utah, and California. There are remains that have been deposited within the period of authentic history. The conclusions drawn from cave remains, as to the antiquity of man, are subject to the doubts that beset all calculations as to the rate of deposit of geological strata and to the rapidity of changes in climates and zoological characteristics. See MOUND-BUILDERS.

Cave-temple, a cave used as a temple; but the name is especially applied to temples excavated in the solid rock, such as exist in considerable numbers in India.

Caveat, kā'vē-ăt (Lat. "let him beware") in law, a notice served upon a public officer or court to refrain from doing a certain act without first giving notice to the caveator, as the person is termed who enters the caveat. Perhaps the best-known use of the caveat is its entry by an inventor in the Patent Office for the purpose of establishing his claim to priority of invention, by enjoining its officers from issuing letters patent for any invention interfering with or infringing the rights claimed by the caveator, without first giving him notice of the application for such letters patent. The terms of the caveat must set forth the claims of the inventor and the details of his invention with sufficient particularity to enable the officials of the Patent Office to determine whether a subsequent application for letters falls within the claims of the first inventor. If such is the case the caveator is entitled to notice of such inter-

fering application, and the new applicant's claim to letters is suspended for three months, during which period the caveator must complete his specifications and file his own application for letters patent. If no interfering application is filed, the caveator's rights remain valid for one year, and may be renewed at the end of that term, for one year more, on payment of a second fee. Other uses of the caveat are to prohibit (without notice to the caveator) the admission of a will to probate, the enrollment of a decree in chancery, the grant of letters testamentary to an executor, the issuing of a commission *de lunatico inquirendo,* etc. On the filing of such a caveat and due notice being served thereunder, a hearing is had before a competent tribunal for the determination of the rights in the matter.

Caveat Emptor, a rule of law that warns the purchaser to take care and examine properly before he buys it. In sales of real estate the purchaser's right to relief depends on the covenants in the deed in the absence of fraud on the part of the vendor. In 1 Serg. & R. 42, the rule is stated as follows:

> "The rule of *caveat emptor* strictly applies to the purchase of lands, and the consideration-money cannot be recovered back after a deed executed, unless in case of fraud, where some covenant inserted in the deed has been broken. The purchaser has it in his power to protect himself by proper covenants, and there is no reason why the law should provide to him a remedy, where he himself has been wholly inattentive and negligent in this particular."

In sales of personal property the purchaser buys at his own risk, in the absence of an express warranty by the seller, or when the law does not imply a warranty from the circumstances of the sale or the nature of the thing sold, and when the seller was not guilty of a fraudulent misrepresentation or concealment. The purchaser must examine the quality of the goods bought and rely upon his own judgment. Generally, if the article purchased is defective, and an examination, such as a reasonable and prudent man would make, would enable him to see the defect, it is not a fraud on the part of the seller not to call his attention to it.

At common law in the city of London, the law of market overt applied to all stores where articles in that particular line were sold. The purchaser got a good title, but as to the quality the purchaser must examine and judge for himself, unless the seller give him an express warranty.

Cavedone, Jacopo, yä'kō-pō kä-vĕ-dō'nā, Italian painter: b. Sassuolo, in the duchy of Modena, 1577; d. Bologna 1660. He was a pupil of Annibale Carracci. His best works are the 'St. Alo,' in the church of the Mendicanti at Bologna, the 'Adoration of the Magi,' the 'Four Doctors,' and the 'Last Supper.' Out of Italy he is frequently mistaken for Annibale Carracci.

Ca'ven, William, Canadian educator: b. Kirkcolm, Scotland, 26 Dec. 1830. He went to Canada with his father in 1847, studied theology at London, Ont., was ordained minister of the United Presbyterian Church, 1852, and was pastor of St. Mary's and Downie, 1852–65. In 1866 he became professor of exegetical theology and biblical criticism in Knox College, Toronto, and principal in 1873, having been chairman of the college board since 1870. He was a promoter of the union of the Canadian Presbyterian churches, moderator of the Church in 1875, and president of the Ontario Teachers' Association, 1877.

Cavendish, kăv'ĕn-dĭsh or kăn'dĭsh, **Frederick Charles,** Lord, second son of the 7th Duke of Devonshire, English statesman: b. Eastbourne 30 Nov. 1836; d. 6 May 1882. He sat in Parliament as Liberal member for the north division of the West Riding of Yorkshire from 1865 till the spring of 1882, when he succeeded Mr. Forster as chief secretary for Ireland. On the evening of 6 May, he and Mr. Burke, an unpopular subordinate, were stabbed to death in the Phœnix Park. Eight months later, 20 «Irish Invincibles» were tried for the murder, and, Carey and two others having turned queen's evidence, five of the rest were hanged, three sentenced to penal servitude for life, and the remaining nine to various terms of imprisonment. Carey himself disappeared; but in July news came from the Cape that he had been shot dead by an Irishman named O'Donnell on board an emigrant ship. O'Donnell was taken back to London and hanged.

Cavendish, George, English biographer: b. about 1500; d. about 1561. He became Wolsey's gentleman-usher at least as early as 1527. He remained in close attendance upon his great master till the latter's death, 28 Nov. 1530, after which he retired to his house at Glemsford, in Suffolk, where he lived quietly with his wife, a niece of Sir Thomas More, till the close of his own life. His affection for the great cardinal was most devoted, and his 'Life of Cardinal Wolsey' is one of the most interesting short biographies in the English language.

Cavendish, Henry, English chemist: b. Nice, Italy, 10 Oct. 1731; d. London 24 Feb. 1810. He was a grandson of the second Duke of Devonshire, and after his education at Peterhouse College, Cambridge, devoted himself exclusively to scientific research. He discovered the peculiar properties of hydrogen, and the qualities by which it is distinguished from atmospheric air. To him we owe the important discovery of the composition of water. Scheele had already observed that, when oxygen is mixed with double the quantity of hydrogen, this mixture burns with an explosion without any visible residuum. Cavendish repeated this experiment with the accuracy for which he was distinguished. He confined both the gases in dry earthen vessels, to prevent the escape of the product of their combustion, and found that this residuum was water, the weight of which was equal to the sum of the weights of the two gases. Lavoisier confirmed this conclusion in later times. Cavendish possessed a profound knowledge of the higher geometry, of which he made a very happy use in determining the mean density of the earth. He found it to be five and a third times greater than the density of water — a conclusion which differs but little from that obtained by Maskelyne in another way. Coulomb investigated the law of attraction between two electrified points directly by means of the torsion balance. Cavendish was, however, the author of the far more exact method of proving the law, which he expressed in the following syllogistic form. He demonstrates mathematically that, if the law of force be any other than the inverse square of the distance, electricity

could not rest in equilibrium *at the surface* of a conductor. But experiment has shown that electricity does rest in equilibrium on the surface of a conductor. Hence the law of force must be the inverse square of the distance. He himself made excellent experiments in order to support his minor premise. He did not, however, consider that his experiments justified him in holding the truth of it as thoroughly established, though he believed it to be true. Since his time the experimental researches of Faraday and others have completely demonstrated the truth of it, and therefore of the law above stated. Cavendish was a member of the Royal Society of London, and in 1803 was made one of the eight foreign members of the National Institute of France. His writings consist of treatises in the 'Philosophical Transactions,' from 1766 to 1792. They are distinguished by acuteness and accuracy.

Cavendish, Margaret, DUCHESS OF NEWCASTLE, English writer: b. Essex 1624 (?); d. 1674. She wrote 'Philosophical Fancies'; a collection of poems, 'The Pastime and Recreation of the Queen of Fairies'; 'Philosophical Letters' (1664).

Cavendish, or **Candish, SIR Thomas,** English navigator: b. Trimley Saint Martin, Suffolk, about 1555; d. at sea off Ascension Island, 1592. Having consumed his property by his early extravagances, he collected three small vessels for the purpose of making a predatory voyage to the Spanish colonies. He sailed from Plymouth in 1586, took and destroyed many vessels, ravaged the coasts of Chile, Peru, and New Spain, and returned by the Cape of Good Hope, having circumnavigated the globe in two years and 49 days, the shortest period in which it had then been effected. For this exploit he was knighted by the queen. In 1591 he set sail on a similar expedition, in which his principal success was the capture of the town of Santos, in Brazil.

Cavendish, William, Duke of Newcastle, English general: b. 1592; d. 25 Dec. 1676. On the approach of hostilities between the Crown and Parliament he embraced the royal cause, and was invested with a commission constituting him general of all his majesty's forces raised north of the Trent, with very ample powers. Through great exertions, and the expenditure of large sums from his private fortune, he levied a considerable army, with which, for some time, he maintained the king's cause in the north. In military matters he depended chiefly on his principal officers, it is said, but the numerous successes obtained by him render this unlikely. In 1643 he obtained a complete victory over Lord Fairfax on Adwalton Moor, and recovered all Yorkshire except Hull; but next year, on the arrival of the Scottish army and its junction with the parliamentary forces, threw himself into York. Having been relieved by Prince Rupert, he was present at the battle of Marston Moor next day, after which he left the kingdom. His term of exile was chiefly spent in Antwerp, where he was for a time so straitened in circumstances that he had on one occasion to pawn his wife's jewels. He returned, after an absence of 18 years, and was rewarded for his services and sufferings with the dignity of duke. His works include 'La Methode et Invention Nouvelle de dresser les Chevaux' (Antwerp 1657); 'A New Method and Extraordinary Invention to Dress Horses, etc.' (1667); some comedies of no merit; and several worthless poems.

Cavendish, William, English statesman: b. 25 Jan. 1640; d. 18 Aug. 1707. He was first Duke of Devonshire, was the son of William, third Earl of Devonshire, and was instructed with great care in classical literature. On various occasions he distinguished himself by his spirit and valor, and in 1677 began that opposition to the arbitrary measures of the ministers of Charles II. which caused him to be regarded as one of the most determined friends of the liberties of his country. Intimately connected with Lord Russell, he joined him in his efforts for the security of free government and the Protestant religion. On the trial of Lord Russell he appeared as a witness in his favor, and offered to assist him in escaping, after he had been sentenced to death, by changing clothes with him in prison. In 1684, having succeeded to his father's title, and being regarded as one of the most formidable opponents of the arbitrary designs of King James II., attempts were made to intimidate him, but without success. He took an active part in promoting the revolution, and was one of the first who declared for the Prince of Orange. His services were rewarded with the dignity of Duke of Devonshire. He still, however, maintained an independent bearing in Parliament.

Cavendish. See JONES, HENRY.

Cav'endish, tobacco which has been softened and pressed into quadrangular cakes, so called after Thomas Cavendish, the Elizabethan circumnavigator.

Cavendish Experiment. See GRAVITATION.

Ca'verypauk, India, a town of Hindustan, in the North Arcot division of Madras Presidency, 57 miles west-southwest of Madras. It is meanly built, and the adjoining fort, at one time a place of some strength, is now in ruins. A victory was gained here by the British under Clive over the French and their allies in 1752. Near the town is an immense artificial pond, eight miles long by three miles broad, by means of which a large tract of country is irrigated. It is perhaps the finest work of the kind in South India. Pop. 7,000.

Caviana, kä-vē-ä'nä, Brazil, an island 35 miles long and 20 miles wide. It lies in the north mouth of the Amazon, under the equator; is level, fertile, and well stocked with cattle. The small town of Roberdello is on its southeastern side.

Caviare, kăv-ĭ-ăr', a table delicacy prepared from the roe of the sturgeon, *Acipenser sturio* or *A. huso*. It is made in great quantities in Russia, especially at Astrakhan, where great quantities of sturgeon are caught in the Volga, and of late years the industry has developed in some of the western States of America. The roe is separated from the skin which encloses it, washed in vinegar, and dried in the sun. A quantity of salt is then rubbed in by hand, and the roe is put into a cloth and pressed to remove the liquor, after which it is packed in small kegs for the market.

Cavite, kä-vē'tä, Philippines, a province in the southwestern part of the island of Luzon, bounded on the north and northwest by Manila Bay, on the north and northeast by the province

of Manila, and on the south by Batangas; area, 510 square miles, with the dependent islands, 610 square miles. In the south and southwest the province is mountainous; in the northwest there is a gradual elevation, forming a fertile plateau. The chief products are coffee, sugar, fruits, and rice (in the lowland regions). In the towns of the interior, hemp and cotton cloth, and sugar are manufactured; in the coast towns the chief industries are salt manufacture and fishing. There is export trade in all these products. There is communication with Manila by water and good roads throughout the province, connecting the coast with the interior. The occupation of Cavite by United States troops was the first event of importance in the Philippines after the naval battle in Manila Bay, 1 May 1898. The government of the province was established under the provincial government act of 6 Feb. 1901; and later several of the dependent islands were added to the territory in Luzon. Pop. 134,500.

Cavite, Philippines, a town and capital of the province of Cavite, on the eastern shore of Manila Bay. A tongue of land about one and a quarter miles long, projecting due east, separates waters of Cañacao Bay on the north, and Bacoor Bay, inner harbor of Cavite, on the south. On this projection are situated fortifications and arsenal. The town is walled, and all the buildings are of stone; it has a parochial church, two convents, and a hospital. It has also several manufacturing industries, and is well equipped for building and repairing vessels. The Spanish fleet had its position off Cavite when attacked by Admiral Dewey on 1 May 1898. The town is the naval headquarters of the United States in the Philippines. Pop. 3,000.

Cavo Relievo, Sculpture in; called also **Coelanaglyphic** and **Concavo-convex Sculpture,** a system of relief in which the figures do not rise above the general surface of the stone, ivory or other material on which the carving is done. It may be looked upon as sculpture in relief, of which the background has not been cleared away in the usual manner. Again, it may be considered as sculpture of which the bounding line has been marked by a groove, generally wedge-shaped, that is with a section like a V: the slope of one side being left as the boundary of the pattern or design, while the other slope disappears in the general rounding of the figures. This sculpture, in architectural art, is almost confined to the Egyptian buildings of times before the Roman domination; but in minor decorative arts the Orientals do beautiful work in this way.

Cavour, kä-voor', **Camillo Benso,** COUNT DI, Italian statesman: b. Turin 10 Aug. 1810; d. 6 June 1861. He was educated in the military academy at Turin, and after completing his studies he made a journey to England, where he made himself acquainted with the principles and working of the constitution. In 1842 he returned to Turin, where shortly afterward he published in the 'Bibliothèque Universelle' of Geneva his 'Considerations on the Present State and Future Prospects of Ireland,' which were subsequently translated into English. With Count Balbo and others he established in 1847 the journal of the 'Risorgimento.' It was not, however, till after the battle of Novara that he entered that political arena in which his name has since become so famous. He became a member of the Sardinian Chamber of Deputies in 1849, and the following year succeeded Santa Rosa as minister of commerce and agriculture. In this office he set himself strenuously to promote the internal prosperity of the country by the establishment of railways and an improved system of postal communications. A new organization was given to the military and naval forces; and the monasteries were, with certain exceptions, suppressed. In November 1852 Cavour became premier, and not long afterward gave a signal proof of his statesmanship by the part which he took in cementing an alliance with Great Britain and France, and making common cause with these powers against the aggressions of Russia. The prestige thus gained to the arms of Sardinia was no less important than that acquired by her liberal and reforming policy in civil matters. The attitude, however, thus taken by Sardinia could not fail to prove extremely offensive to the neighboring power of Austria, to whose arbitrary and repressive measures the government of Victor Emmanuel displayed itself as a standing reproof, and whose supremacy in Italy was eminently jeopardized by the aspirations of Sardinia. A collision, therefore, was inevitable, resulting in the campaign of 1859. The intimate connection formed at that time with France, who lent her powerful assistance in the prosecution of the war, was mainly due to the agency of Cavour, who was accused by some on this occasion of having purchased the assistance of Louis Napoleon by unduly countenancing his ambitious projects. The marriage of Victor Emmanuel's daughter, the Princess Clotilde, with Prince Napoleon, was consummated in the early part of 1859, and the conclusion of the same year witnessed the cession of Nice and Savoy to France. In bringing about both of these results Cavour took a leading part. In 1860 Garibaldi's expedition to Sicily took place; but toward this and the subsequent movements of the Italian liberator, Count Cavour manifested an apparent coldness, which diminished somewhat his estimation in the minds of the more zealous Italian patriots. See Romilly, 'Reminiscences of the Life of Cavour' (1863); Dicey, 'Cavour: a Memoir'; Bianchi, 'La Politique de Cavour' (1885); 'Lives' by Massari (1873); Mazade (1877); Martinengo-Caesaresco (1897).

Cavy, kā'vĭ, a small rodent of the family *Caviidæ,* related to the paca and aguti, and characterized by its stout build, short legs, small ears, pink eyes, and total absence of a tail. Cavies are semi-nocturnal animals; feed upon roots and vegetable fare, and are widely distributed throughout the plains and unforested highlands of South America. The only domesticated and familiar species is the much modified guinea-pig (q.v.), which is about eight inches long, and owing to its harmlessness, is a great household pet among children. The largest species of cavy (*C. patchonica*), wrongly called "agouti," is scantily distributed throughout the plains of Argentina. It is rusty red in color, and about the size of a hare, standing on terrier-like legs. The "restless" cavy (*C. porcellus*), and Cutler's cavy (*C. cutleri*), are common in the La Plata valley, and are uniformly colored with grayish-brown or black. Other species are found in Brazil and Bolivia.

Cavies live in burrows of their own digging, and breed twice a year, the number of young varying with the climate. The young are brought forth in a very advanced state of development. Their eyes are open and they are capable of running by the side of their mother in a few hours' time. In less than a fortnight they are quite able to care for themselves. Consult: Hudson, 'Naturalist in La Plata'; and Lydekker, 'Standard Natural History.'

Cawdor, kô'dėr, Scotland, a village in Nairnshire, 5½ miles southwest of Nairn. Cawdor Castle, near by, the seat of the Earl of Cawdor, was founded in 1454, but is one of the three places which tradition has assigned as the scene of King Duncan's murder by Macbeth in 1040. A series of papers from the charter-room at Cawdor was edited (1859) by Cosmos Innes under the title of 'The Book of the Thanes of Cawdor.'

Cawdor, Thane of, in Shakespeare's 'Macbeth,' a character who does not appear upon the stage. On account of his alliance with the Northmen he is condemned to death by Duncan, who calls him "that most disloyal traitor." His title is given to Macbeth, in accordance with the prophecy of the witches. In describing his death it is thought that Shakespeare had reference to the execution of the Earl of Essex.

Cawein, kaw'ĕn, **Madison Julius,** American poet: b. Louisville, Ky., 23 March 1865. His verse is often exceedingly musical and displays great command of metres. Its defects are over ornamentation, and a too profuse employment of adjectives, but the note which he strikes is distinctive and pleasing. He is at his best in his purely Kentuckian poems. His works include: 'Blooms of the Berry' (1887); 'The Triumph of Music' (1888); 'Accolon of Gaul' (1889); 'Lyrics and Idyls' (1890); 'Days and Dreams' (1891); 'Moods and Memories' (1892); 'Intimations of the Beautiful' (1894); 'Poems of Nature and Love' (1893); 'Red Leaves and Roses' (1893); 'Undertones' (1895); 'The Garden of Dreams' (1896); 'Shapes and Shadows' (1898); 'Idyllic Monologues' (1898); 'Myth and Romance' (1899); 'One Day and Another' (1901); 'Weeds by the Wall' (1902).

Cawnpore, kôn-pōr, or **Cawnpur,** kôn-poor', India, capital city of the district of the same name, in the Northwest Provinces, on the right bank of the Ganges, which is here about a mile wide, 130 miles northwest from Allahabad. It is a modern town with nothing specially noteworthy about it as regards site or buildings. There are several churches, a theatre, various military and other offices, high school, club, etc. It manufactures leather and cotton goods, has a large trade, and is an important railway centre. In 1857 the native regiments stationed here mutinied and marched off, placing themselves under the command of the Rajah of Bithur, the notorious Nana Sahib. Gen. Wheeler, the commander of the European forces, defended his position for some days with great gallantry, but, pressed by famine and loss of men, was at length induced to surrender to the rebels on condition of his party being allowed to quit the place uninjured. This was agreed to; but after the European troops, with the women and children, had been embarked in boats on the Ganges, they were treacherously fired on by the rebels; many were killed, and the remainder conveyed back to the city, where the men were massacred and the women and children placed in confinement. The approach of Gen. Havelock to Cawnpore roused the brutal instincts of the Nana, and he ordered his prisoners to be slaughtered, and their bodies to be thrown into a well. The following day he was obliged, by the victorious progress of Havelock, to retreat to Bithur. A memorial has since been erected over the well in the form of an angel with palm branches, and fine public gardens, covering 50 acres, now surround the spot. Including the native city, cantonments, and civil station, it had in 1901 a population of about 197,000.

Caxamarca. See CAJAMARCA.

Caxias, kā-shē-ās', the name of two places in Brazil: (1) A town in the state of Maranhão, on the navigable Itapicuru, 190 miles from its mouth, with an active trade in cotton. Pop. 10,000. (2) An Italian agricultural colony in the Brazilian state of Rio Grande do Sul, founded in 1875. Pop. 13,680.

Caxton, William, first English printer: b. Kent about 1422; d. London 1491. In 1438 he was bound apprentice to Robert Large, a mercer in London, and soon after his master's death (1441) he went to Bruges, where, in 1446, he went into business on his own account. About 1463 he was appointed "governor" at Bruges for the English merchants settled in the Low Countries, a post in which he continued for some years. About 1471 Caxton entered the service of Margaret, Duchess of Burgundy, sister of Edward IV. He had already begun a translation of the popular romance entitled 'Le Recueil des Histoires de Troye,' and this he finished at Cologne in 1471. In order to meet the demand for the book he learned the art of printing, probably at Cologne, and his 'Recuyell of the Histories of Troy,' the first English printed book, appeared about 1474, having issued, it is supposed, from the press of Colard Mansion at Bruges. His 'Game and Playe of the Chesse,' also a translation from the French, was probably a production of the same press in 1475, and is the second English book printed. He left Bruges in 1476, returned to England, and in 1477 had a press at Westminster Abbey, where he printed the 'Dictes and Sayings of the Philosophers,' the first typographical work executed in England. Caxton continued to exercise his art for about 14 years, during which time he produced nearly 80 works, many of them translated by himself from the French, and one of them — 'Reynard the Fox'— from the Dutch. He was patronized by Edward IV., Richard III., and Henry VII.; and he was on intimate terms with Earl Rivers, the Earl of Worcester, and others of the nobility, the two noblemen named having even translated works for his press. He was buried in the Church of St. Margaret's, Westminster. Besides the books already mentioned, Caxton printed Chaucer's 'Canterbury Tales'; 'Troylus and Creside'; 'Book of Fame,' and translation of Boethius; Gower's 'Confessio Amantis'; works by Lydgate; Malory's 'King Arthur'; 'The Golden Legend'; 'The Fables of Æsop,' etc. His books have

no title pages, but are frequently provided with prologues and colophons. His types are in the Gothic character, and copied so closely from the handwriting of his time that many of his books have been mistaken for manuscript. In some no punctuation is used; in others the full point and colon only; commas are represented by a long or short upright line. Copies of some of his books now bring extraordinary prices when sold. The standard 'Life of Caxton' is that by W. Blades (1861–3).

Caxtons, The, a novel by Edward Bulwer, Lord Lytton, published in 1850. 'The Caxtons' was not only instantly popular in England, but 35,000 copies were sold in America within three years after its publication in 1850. Never before had Bulwer written with so light a touch and so gentle a humor, and this novel has been called the most brilliant and attractive of his productions. His gentle satire of certain phases of political life was founded, doubtless, on actual experience.

Cayambe'-Urcu, kā-yām-bā'-oor'koo, or **Cayambe',** a summit of the Colombian Andes, lying directly under the equator in Ecuador. It rises in the shape of a beautiful and regular cone to a height of 19,187 feet. Its top is crowned with perpetual snow, and its geographical position and great elevation render it one of the most remarkable mountains of the world.

Cayenne, kā-yĕn' or kī-ĕn', French Guiana, a city and capital of the colony, situated in lat. 4° 56′ N., lon. 52° 20′ W. The first casual occupants were the Dutch, at the beginning of the 17th century. The French, under Charles Poncet, settling here, as well as at other points on the Guiana coast, 20 years later, were driven out by the natives, but undertook another expedition in 1643. Again unsuccessful, they made a third futile effort in 1652; then they deserted the town. The Dutch re-occupied it, but were obliged to surrender possession to a new French expedition. After the Treaty of Breda the Dutch once more took Cayenne, and were attacked there by the French in 1676. The French settlement was permanently established at the beginning of the 18th century. Present population, about 10,000, of whom more than half are convicts, including the negroes, Anamites, and Arabs, transported for crimes committed in the French, African and Asiatic colonies. White criminals have in recent years been sent elsewhere, as a rule, but Alfred Dreyfus, captain in the French army, after his conviction of treason in December 1894, was condemned to solitary confinement on the Ile du Diable, a remote outpost of the Cayenne penal settlement (27 miles away, off the northwest coast), and there remained until taken back to France for a new trial. The climate of the capital, which is built on an island east of the mouth of the Cayenne River, is rendered exceedingly unwholesome by the low and swampy character of a part of the neighboring coast. The harbor is shallow, yet the products of the country — gold, sugar, molasses, rum, coffee, hides, spices, cocoa, etc. — are shipped in considerable quantities each year. The recent discovery of diamonds (1900–3) in the interior of the Guianas suggests a possible development of trade, and a better use of American territory in the future. See GUIANA.

Cayenne Pepper, or **Capsicum,** a powder formed of the dried and ground fruits, and more especially the seeds, of various species of *Capsicum,* and especially of *C. frutescens.* It is employed as a condiment to improve the flavor of food, aid digestion, and prevent flatulence. In medicine it is used as a stimulant, and is a valuable gargle for a relaxed throat. See CAPSICUM.

Cayes, kā, Les. See AUX CAYES.

Cayley, kā'lī, **Arthur,** English mathematician: b. Richmond, Surrey, 16 Aug. 1821; d. London 26 Jan. 1895. He received his early education at Blackheath and King's College, London, passing subsequently to Trinity College, Cambridge. Called to the bar in 1849, he practised for some years as a conveyancer, but in 1863 was appointed first Sadlerian professor of pure mathematics at Cambridge. Trinity College in 1875 accorded him the rare honor of electing him a Foundation Fellow. He received many distinctions from universities and learned societies both at home and abroad, and in 1883 he presided over the meeting of the British Association at Southport. He seldom identified himself with movements outside his own immediate work, but took a prominent part in the agitation for the higher education of women, which resulted in the foundation of Newnham College. As a mathematician he was characterized by the wide scope and originality of his work. His chief memoirs deal with differential equations, elliptic functions, and determinants. His 'Elementary Treatise on Elliptic Functions' appeared in 1876, and 'Single and Double Theta-functions' in 1881; and in 1889, a collected edition of his papers began to be issued, extending over a number of volumes. In 1882 he lectured in Johns Hopkins University, Baltimore.

Cayley, SIR **George,** English scientist: b. Brompton, Yorkshire, 1773; d. 15 Dec. 1857. His genius first displayed itself in the analysis of the mechanical properties of air under chemical and physical action. His papers on the subject gave rise to many experiments on the navigation of balloons at home and abroad. His experiments on the steam engine led to his invention of the air engine. His discoveries in optics were followed by the invention of an instrument for testing the purity of water by the abstraction of light. He was also the inventor of an ingenious arrangement for obtaining and applying electric power to machinery. He was one of the original promoters of the polytechnic institution at London. Toward the end of the 19th century he applied to his extensive estates in Yorkshire a new system of arterial drainage. He was also the father of the cottage allotment system. As a politician, he took a prominent part in the election of liberal members of Parliament, and the return of Brougham was chiefly due to his sympathy with the reform bill. Upon the passing of that bill he was himself chosen as member for Scarborough, but on account of his advanced age, soon retired.

Cayleyan, kā'lē-an, in mathematics, the name for a family of curves investigated by Prof. Cayley, of Cambridge, and by him called pippians. The Cayleyan is of the sixth order, and is exhibited as the envelope of right lines, considered in couples, which are polar conics of the general curve of the third order. In Cayley's

notation, if the cubic is $U=(*)(x, y, z)^3=0$ then $PU=0$ is the Cayleyan. See Cayley, 'Collected Mathematical Papers,' Vol. I., p. 183, and Vol. II., p. 381.

Caylus, Anne Claude Philippe de Tubières, ăn klōd fē-lēp dė tü-bē-ār kā-lüs, COUNT OF, French archæologist: b. Paris 31 Oct. 1692; d. there 5 Sept. 1765. He was a son of the Marquise de Caylus (q.v.), and after having served in the army during the war of the Spanish succession, he left the service in 1715, accompanied Bonac on his embassy to Constantinople the following year, and visited Greece, Troy, Ephesus, Byzantium, and Adrianople. In 1717 he returned to Paris, and began the arrangement of his extensive collections. He commenced a great work on Egyptian, Grecian, Etruscan, Roman, and Gallic antiquities, with numerous plates. He was a member of the Academy of Painting and of the Academy of Inscriptions, and divided his labors between them. He made a chemical examination of the ancient method of encaustic painting, investigated the mode of painting on marble, the art of hardening copper, the mode by which the Egyptians raised great weights, the mummies, painting on wax, and many other subjects. Integrity, simplicity, and disinterestedness were united in his character, with occasional traits of dogmatism. He has left numerous works, tales as well as antiquarian researches. Among the latter is his 'Recueil d'Antiquités Égyptiennes' (1752-67, 7 vols.). Caylus was also an industrious and skilful engraver, and produced a collection of more than 200 engravings, after drawings in the royal cabinet, and a great number of heads, after the first masters.

Caylus, Marthe Marguerite de Villette, mär-tė mär gėr ēt dė vēl-ĕt, MARQUISE DE, French writer of memoirs: b. Poitou 1673; d. Paris (?) 15 April 1729. Long an ornament of the brilliant court of Louis XIV., she passed her declining years in dictating 'My Recollections,' in which a valuable insight into the life of Louis XIV. is afforded, through the medium of a singularly happy style.

Cayman, kā-măn, or **Caiman,** kā-ē'măn, any of five species of alligators inhabiting the fresh waters of Central and South America. The caymans are distinguished from other alligators in having an armor of overlapping bony scutes protecting the belly, as well as an armor of bony plates on the back. The black cayman (*Caiman niger*) of tropical South America east of the Andes is the largest species, reaching a length of 13 feet. In some of the rivers of South America caymans are found in vast numbers and are said to be extremely voracious.

Cay'mans, The, or **Cayman Islands,** three islands situated in the Caribbean Sea, about 140 miles northwest of Jamaica, of which they are dependencies. Grand Cayman, the largest of the three, is 17 miles long, and from 4 to 7 broad. It is well wooded. The natives are chiefly employed in agricultural operations or in trading with Jamaica and other places. They cultivate sugarcane and vegetables, and raise cattle, pigs, poultry, etc. Turtle and cocoa-nuts are exported. The climate is very healthful. There are several Presbyterian places of worship. A large proportion of the inhabitants are whites. Pop. about 2,500. Cayman Brac has about 500 inhabitants, mostly white, Little Cayman, 40 or 50, all white.

Cayuga (kā-yoo'gā) **Lake,** a lake in the State of New York, on the boundary of Cayuga and Seneca counties, and extending south into Tompkins County, 38 miles long and from 1 to 3½ miles wide. It is much frequented by pleasure parties. The town of Ithaca stands at the southern extremity of the lake.

Cayu'gas ("swamp-dwellers," possibly in reference to their cranberry swamps) a tribe of North American Indians, forming the smallest of the original Five Nations of the Iroquois, and according to Onondaga tradition, the last to join the confederacy; whence it was called "The Youngest Brother." The tribe was not inferior in energy and original genius, however; several of the chiefs were men of superior ability, as Karistagea, or Steeltrap; and Tahgahjute, or "Logan," the son of one of its sachems. The latter will be ever remembered, not only for the pathetic speech attributed to him, but for his high personal qualities. Nor were the Cayugas inferior in fighting prowess: in one of their Virginia campaigns they seem to have destroyed the tribe of Tuteloes, and incorporated with their own tribe the remnant who were not slain. They were friendly to the whites, however, and bore a good reputation. They were located along the Cayuga Lake in central New York, and in the valley of its outlet, the Seneca River. At the outbreak of the Revolution, they joined the Mohawks and Senecas in alliance with the British against the Americans, and shared in the devastation of the property of the patriots during Sullivan's campaign; the most of them settled in Canada with the other Iroquois, 200 remaining in New York, apparently around Niagara. In 1789 they made their first formal cession of territory to the whites, confirming it by a treaty at Fort Stanwix in 1790; in 1795, by a treaty at Cayuga Bridge, they ceded their great reserve in the lake basin and the river valley, retaining only one of four miles square. For these releases they received large money annuities, which they used largely for liquor. In 1806 all the remainder left the reservation and emigrated westward or northward; some joining their brethren in Canada, some going to Sandusky, Ohio, others settling among the Senecas near Buffalo. There are at present about 1,300 in all, the bulk of them at the Six Nations on Grand River, Ontario, some with the Oneidas in Wisconsin, about 170 with the Senecas in New York State, and others with the Senecas in Indian Territory.

Cayuse, kā-yoos', **Cailloux,** or **Willetpoo,** a tribe of North American Indians who formerly inhabited the region between the Des Chutes River and the Blue Mountains, Oregon, and also parts of Washington, south of the Yakima River. There are now only about 415 persons, presumably of Cayuse blood, on the Umatilla reservation.

Cay'van, Georgia, American actress: b. Bath, Maine, 1858. She went on the stage early in life and won note as Dolly Dutton in 'Hazel Kirke.' She was afterward with A. M. Palmer and Daniel Frohman. She became leading lady of the Lyceum Theatre Stock Company in 1897, retiring from the stage soon afterward.

Cay'zer, Charles William (CHARLES WHITWORTH WYNNE), English shipowner and poet: b. Bombay 19 July 1869. He was educated at Rugby and Christ Church, Oxford, and has published 'Ad Astra' (1900), a very extensively advertised volume; 'Songs and Lyrics' (1900); 'King David' (1902).

Cazal, Manuel Ayres de, mä'noo-ĕl ī'rĕz dā kä-zäl', Portuguese historian: b. 1754; d. about 1821. He was for a long period prior at Crato, Goyaz, Brazil, devoting himself to historical and geographical research, publishing in 1817, 'Corographia Brasilica, on relaçao historica-geographica do reino do Brazil,' a much valued work.

Cazalès, Jean Antoine Marie de, zhŏn äṅ-twäṅ mä-rē dė kä-zä-lās, French politician: b. Grenade, Haute-Garonne, France, 1 Feb. 1758; d. Engalin, Gers, France, 24 Nov. 1805. The son of a counselor of the Toulouse parliament, he served for some time in Jarnac's regiment of dragoons. Being chosen in 1789 a deputy of the noblesse to the States-General, he became one of the most able and eloquent opponents of the Revolution, but was treated with ingratitude by the royalists, although he had labored and suffered much in their cause, and barely escaped being put to death. Having traveled abroad during the reign of terror, he returned to France in 1801. Napoleon conferred on him, although he had refused to enter his service, the cross of the Legion of Honor. His 'Discours et opinions' and his 'Défense de Louis XVI.' were published in 1821.

Cazalla de la Sierra, kä-thäl'yä dā la sē-ĕr'rä, Spain, a town in the province of Seville, and 36 miles northeast of the city of Seville, on a declivity of the Sierra Morena. Its streets are clean, paved, and well arranged; and it has two squares, in the principal of which are the ancient church and town-hall. The mountains in the vicinity are rich in metals. Pop. about 9,000.

Cazauran, kä'zō-răn, **Augustus R.,** Franco-American author and playwright: b. Bordeaux, France, 31 Oct. 1820; d. New York 27 Jan. 1889. He was educated at the University of Dublin. In 1848 he became implicated in an Irish rebellion, fled to the United States and obtained employment as a reporter. During the Crimean war he acted as war correspondent to a London daily. Afterward he was connected with the Cincinnati *Enquirer* and became chief editor of the Memphis *Argus*. When Lincoln was shot he was at the theatre as dramatic critic, and wrote the first account of the assassination. In 1869 he went to New York, did dramatic work, and gathered about him a remarkable company of artists. He adapted 'Miss Multon,' 'The Danicheffs,' 'Man of Success,' 'The Mother's Secret,' 'Lillian's Lost Love,' 'The Banker's Daughter,' 'The Celebrated Case,' 'Lost Children,' 'French Flats,' 'Mother and Son,' 'Felicia,' 'The Creole,' 'Daniel Rochat,' 'A Parisian Romance,' and 'The Ranzar.'

Cazembe, kä-zĕm'bĕ, or **Cazembe's Dominion,** Africa, a region formerly constituting a large and well-ordered negro state lying south and southwest of Lake Tanganyika, and taking its name from the title of the sovereign. The country forms a kind of basin, bounded on the east by a plateau which rises to the height of from 3,000 to 4,000 feet; on the west, also, it is bounded by a series of heights. On the south it has the lofty watershed which separates its streams from those of the Zambesi River system. Its principal stream is the Chambezi, which flows westward into Lake Bangweolo, then northward, under the name of the Luapula, into Lake Moero. The ruler, or muata, used to be feared as a great magician; he had over 600 wives, and maintained a well-armed body of troops, numbering at one time, it is said, 20,000. His dominions were divided into districts, each of which had a governor of its own. These governors and other men of rank formed a body of privileged nobility; all the rest of the inhabitants, farmers, artisans, etc., were looked upon as slaves of the ruler. The population consisted of a ruling race, the Campololos, who had invaded and conquered the country, and the Messiras, the original inhabitants. It was only Campololos that received official posts, and the Campololo language was the one spoken at court. The people were industrious agriculturists, growing crops of mandioc, maize, sorghum, etc. They manufactured coarse cloths, cords, nets, lines, etc., from cotton and the fibres of certain plants; made weapons and implements of iron; also earthenware, wooden vessels, etc. Cazembe was visited by Lacerda in 1799, and by other Portuguese explorers in 1831. Dr. Livingstone, in 1867, stayed 40 days at the capital, which he found to consist of a number of huts dotted over a large area, and having probably not more than a thousand inhabitants. The Cazembe at this time was a usurper, whose cruelties had done much to depopulate the country, and it was doubtful if he could bring a thousand warriors into the field. The country, which had been ravaged by the slave trade, now belongs partly to the British sphere of influence, partly to the Congo State.

Cazin, Jean Charles, zhŏn shärl kä-zăn, French artist: b. Samer, Pasde-Calais, about 1840. He studied under Le Coqu de Boishaudran, obtained a first-class medal at the Salon in 1882 and was made an officer of the Legion of Honor 1889. He is best known as a landscape painter, although frequently introducing figures into his paintings. His coloring and sentiment are much admired.

Cazorla, kä-thôr'lä, Spain, a town in the province of Jaen and 41 miles east of the city of Jaen. It rises in the form of an amphitheatre on the slope of the Sierra de Cazorla, and is well built, though much less important and populous than in the time of the Moors, during whose wars it held an important position. The Sierra de Cazorla is a wooded ridge round which winds the upper course of the Guadalquivir. Pop. about 6,000.

Cazot, Théodore Joseph Jacques, tā-ō-dôr zhō-zĕf zhäk kä-zō, French politician: b. Alais 11 Feb. 1821. In 1848 he was active as a Republican in his home department; in 1870 he was appointed general secretary in the ministry of the interior; in 1871 elected to the National Assembly; and in 1875 was made life senator. From 1879–82 he was minister of justice and was interested in bringing about a reform in the appointment of judges, but retired without passing the law he desired. In 1883 he was president of the court of cassation, resigning in 1884 on account of being implicated in fraudulent dealings.

Cazotte, Jacques, zhāk kā zŏt, French poet: b. Dijon 1720; d. 25 Sept. 1792. His masterpieces are: 'Oliver' (1762), a poem of chivalry after the manner of Ariosto; and 'The Devil in Love' (1772), a tale of wonder, still a popular favorite. He had extraordinary skill in versifying, as shown by his adding a seventh canto to Voltaire's 'Civil War of Geneva' with such perfect imitation of Voltaire's style and manner as to deceive all Paris.

Cazwini, käz-wē'nē, Zacharia Ben Mohammed, Arabian naturalist: b. Cazwin, Persia, 1212; d. 7 Aug. 1283. He was descended from a family of lawyers, who derived their origin from Anas Ben Malek, a companion of Mohammed, and had settled in Cazwin, a city in Persia. From that place this author received the surname under which he has become celebrated. Of the circumstances of his life we know little more than that he was cadi of Wazith and Hillah, and died in the year of the Hegira 682 (1283 A.D.). His most important work is on natural history — 'The Wonders of Nature and the Peculiarities of Creation' — of which Ideler, professor in the University of Berlin, published the chapter on the 'Constellations of the Arabians,' and of which there are fragments in Bochart's 'Hierozoikon,' in Ouseley's 'Oriental Collections,' and in Wahl's, Jahn's, and De Sacy's 'Arabic Chrestomathies.' It was the object of Cazwini, like Pliny, to describe the wonders of all nature. His work contains a comprehensive view of all that had been written before him, but in so grand and original a manner that it is of higher value than most of the original works which treat of the same subjects. There is an abridged translation of it in the Persian.

Cean-Bermudez, Juan Agustin, hoo-ān' ā-goos'tīn thā-ān' bĕr-moo'dāth, Spanish archæologist: b. Gijen, Asturia, 17 Sept. 1749; d. Madrid 3 Dec. 1829. He devoted himself early to the study of the fine arts, into which he was initiated by Raphael Mengs. After holding a public office at Madrid, he retired to Seville, where he founded an academy of fine arts, and occupied himself with the study of their history. He was elected a member of the royal academies of history and fine arts at Madrid, and published several valuable works connected with his favorite pursuits. His most important book, entitled 'Sumarie de las antiguedades romanas que hayen España,' appeared posthumously in 1832.

Ceano'thus, a genus of shrubs and small trees of the natural order *Rhamnaceæ*. There are about 35 species, natives of the Pacific coast region of North America. They are characterized by serrate or entire simple leaves; small, perfect, white, purplish, or blue flowers in showy clusters, which are often panicled; and three-celled drupaceous fruits, which, on drying, separate into three stones. Many of the species and their hybrids are popular ornamental shrubs, especially in mild regions, their free-blooming habit rendering them specially useful as lawn specimens. Three species, *C. americanus, C. ovatus,* and *C. fendleri,* and some of their hybrids, are hardy in the north, but usually the hybrids must either be protected from frost or stored over winter in a plant-pit or frost-proof cellar. They succeed in almost any soil, but do best in light, well-drained loams, especially when exposed to the sun. Propagation is easily effected by seeds, cuttings, or layers, *C. americanus,* known as New Jersey tea and red-root, is common from Canada to the Gulf States. Its leaves are said to be used as a substitute for tea, a use to which they are reported to have been put during the American Revolutionary war.

In medicine ceanothus has not been used to any great extent. Its roots contain from 6 to 10 per cent of tannin, and have been used in domestic medicine as astringents. Owing to the close resemblance of the roots, ceanothus has been used as an adulterant for rhatany.

Ceará, sā-ā-rā', Brazil, a state bounded on the north and east by the Atlantic Ocean and Rio Grande do Norte, on the south by Parahyba and Pernambuco, and on the west by Piauhy. Its area is 40,250 square miles, and its population 881,686. The principal port and capital of the state is Fortaleza (q.v.), which is regarded as one of the most beautiful cities of Brazil. A railroad connects Fortaleza with Baturité. The principal exports of Ceará (statistics of 1899) are: rubber, cattle, cotton, hides, mules, preserved fruits, and hammocks. Coffee, sugar, wine of the cashew nut, oranges, and wax are also produced. The estimated value of all the exports is about $5,000,000 annually, in which amount the United States shares to the extent of nearly one third. Ceará is divided into 27 comarcas, or counties. The most fertile and populous district is the upper Jaguaribe.

Ceará-mirim, a city in Brazil. Pop. 18,000.

Ceballos, José, hō-sā' thā-bāl'yōs, Mexican soldier: b. Durango 15 March 1830. In 1869 he had command of a regiment in the province of Yucatan; while here a portion of his soldiers revolted, but he suppressed the insurrection in three days; he also executed without authority several private citizens who were implicated in the revolt. In 1870 he was made brigadier-general and given command in the western states, where he had charge of the campaign against the bandit chief, Losada. When Lerdo de Tejada became president of Mexico, Ceballos was put in command of the force sent to depose Camerana, the governor of Jalisco. After a severe struggle between the state and government forces, Caballos was successful and became governor, a position which he held till 1876. At that time Tejada was deposed by Diaz; Ceballos joined with Iglesias, but was forced to leave Mexico for a time. He went first to California, then to Guatemala, where he was appointed director of a military school. Though at first plotting a revolution against Diaz he suddenly turned to his support, returned to Mexico, was restored to his rank, and made governor of the federal district. He has been a bitter enemy of the press, and in 1885–6 had a number of students and journalists arrested.

Ce'bes, of Thebes, Greek philosopher, a disciple and friend of Socrates, and the reputed author of the 'Pinax,' or «votive tablet,» a philosophical dialogue representing allegorically the temptations of this life and teaching that true learning can alone make for happiness. In spite of its pure Attic, and its truly Socratic tendency, modern criticism now assigns the work to the 2d century A.D. It was extremely popular in

the Middle Ages, a sort of 'Pilgrim's Progress,' indeed; was translated into all the languages of Europe, as well as Arabic, which latter version, made possibly in the 9th century, is our sole record of the close of the dialogue. Modern editions are those of Drosihn (1871); Kraus, (1882); Parsons (1887).

Cebidæ, sĕb'ĭ-dē, a family of American monkeys, including the howler, saki, sapajou, spider-monkey (qq.v.), etc. See also MONKEY.

Cebu, thā-boo' or sĕ-boo', Philippines, an island lying between Negros and Bohol, north of Mindanao. Its length northeast and southwest is 139 miles; width, 24 miles; area, 1,668 square miles. It has a mountain system consisting of a chain running the length of the island, nearer the east than the west coast. The mountains are not over 2,200 feet high, but their ascent is steep and it is difficult to cross them. There are six passes, the best being the southernmost, from Sibonga to Dumanjug, over which United States army officers constructed a temporary wagon road in the summer of 1900. The chief products are rice, chocolate, sugar, and coffee. There are manufactures of hemp and piña cloth, sugar-sacks, cocoanut wine, sugar, salt, and cheese. In 1827 coal was discovered in Cebu, the first found in the Philippines. It is of good grade, adapted to general use. The trade of the island is extensive. Besides the mountain passes there are two main highways, one on the east coast, and one on the west coast, while the port of Cebu has communication with Manila and the islands of the Visayan group. Cebu was first occupied by United States troops in February 1899. Operations against the insurgents resulted in driving them from their position, and capturing a large quantity of material of war. This island, with a few dependent islands, forms the province of Cebu, in which civil government was created under the provincial government act of 1901. At that time several of the cities had organized their municipal governments according to the code of the Philippine commission. Though the province was restored to military government for a time in 1901, civil government was permanently resumed in January 1902. Pop. (province) 518,000.

Cebu, Philippines, capital of Cebu province, situated on the east coast of the island of Cebu. The streets are wide and regularly laid out. There is a cathedral in one of the suburbs, and it has also several other churches and an Episcopal palace. Cebu is an important port with an extensive trade. It is the oldest Spanish settlement in the Philippines. In the "Rizal," a building in front of the Santo Nino Church, is the cross which it is said was planted near the town by Magellan when he took possession of the island. An old fort built by the Spaniards stands within the limits of the town. Pop. 35,243.

Cecchi, Giammaria, jäm-mä-rē'ä chĕk'kē, Italian dramatist: b. Florence 14 April 1518; d. there 28 Oct. 1587. He was the rival of Bibbiena, Machiavelli, and Ariosto in portraiture of character and in liveliness of dialogue. Of his plays, 95 in number, but few have been printed. These are mainly imitations of Plautus and Terence; the best of them are: 'The Hammer'; 'The Slave'; and, the most famous of all, 'The Owl.' He wrote also religious dramas; among them 'The Exaltation of the Holy Cross' (1580).

Cecco d'Ascoli, chĕk'kō dās'kō-lē, properly Francesco Stabili, Italian poet: b. Ascoli about 1257; d. Florence 16 Sept. 1327. He was a devoted student of astrology and of demonology. For the expression and defense of certain erroneous opinions he was burned at the stake. His heretical or impious doctrines are contained in a poem, unfinished but of encyclopædic compass, 'Bitternesses,' of which he lived to complete four books. The subject of the first book was astronomy with meteorology; of the second, stellar influence with physiognomy; of the third, minerals; of the fourth, sundry problems, moral and physical.

Cech, chĕk, **Sva'topluk,** Czech writer: b. Ostredek 21 Feb. 1846. He was editor in succession of several journals, and at the same time practised law. After winning some celebrity as a writer of stories and short poems, he made a bolder flight in 1872 with 'Dreams,' in which he shows great epic power. Besides this he has written several other poems, as 'The Adamites'; 'The Storm'; 'Songs of Morning.' He is the most popular of Czech poets. As a novelist he excels in lively wit and rich humor. Among his works of prose fiction may be named: 'Stories, Arabesques, and Humoresques'; and the amusing 'Candidate for Immortality.' He has written also 'Memories from the Orient' (1885), as well as later volumes.

Cecidomyia, sĕs-ĭ-dō-mī'ya, a genus of two-winged flies, of the family *Cecidomyiidæ,* the gall-gnats (q.v.).

Cecil, sĕs'ĭl or sĭs'ĭl, **Evelyn,** English writer: b. 1865. He was educated at Eton and New College, Oxford, studied law and became a barrister of the Inner Temple. He was a private secretary to the Marquis of Salisbury, 1895–1902, and sat in the House of Commons as member for East Herts, 1898–1900. He was the last Englishman who conferred with Presidents Kruger and Stein prior to the beginning of the Transvaal war in 1899. He has published 'Primogeniture: a Short History of its Development in Various Countries and Its Practical Effects' (1895); 'On the Eve of the War' (1900).

Cecil, Robert, Earl of Salisbury, English statesman, second son of William Cecil, Lord Burleigh (q.v.): b. about 1563; d. Marlborough, Wiltshire, 24 May 1612. Having received the honor of knighthood he went to France as assistant to the English ambassador. On the death of Sir Francis Walsingham he succeeded him as principal secretary, and continued to be a confidential minister of Queen Elizabeth to the end of her reign. Having secretly supported the interests of James I. previous to his accession to the crown he was continued in office under the new sovereign and raised to the peerage. In 1603 he was created a baron, in 1604 Viscount Cranbourn, and in 1605 Earl of Salisbury. In 1608 he was made lord high treasurer, an office which he held till his death.

Cecil, William, LORD BURLEIGH. See BURLEIGH.

Cecil Dreeme, a novel by Theodore Winthrop, published in 1862. By its brilliancy of style, crisp dialogue, sharp characterization, and ingenuity of structure, it won an immediate popularity.

Cecil'ia, Saint, Christian virgin and martyr; her day in the Roman calendar is 22 November. Her story as recounted in the 'Breviarium Romanum,' represents her as a Roman lady of noble birth, a Christian from childhood, and from her early years vowed to virginity. Yet her parents gave her in marriage to a young noble, Valerianus, whom Cecilia persuaded not only to respect her vow, but also to become a Christian; and he, converted, induced also his brother, Tiburtius, and their intimate friend, Maximus, to enter Christ's fold; shortly after these three suffered martyrdom together. Cecilia now, in anticipation of the same fate or the same crown, distributed her possessions among the poor, and this becoming known to the prefect of Rome he ordered her to be taken to his own mansion and there burned to death in the bath (*in balnes*). But the virgin, exposed to the flames for a day and a night, was found unhurt; and after the axe of the headsman had also failed to sever her head from her body, at last she won the double wreath of virginity and martyrdom; this was in the reign of Alexander Severus and in the pontificate of Urban I., about the year 230. Urban erected a church in her house which was called by her name. The Church of St. Cecilia is still one of the most notable churches of Rome, having been again and again repaired or reconstructed. In this account of Saint Cecilia nothing is said of the musical accomplishments of the virgin, but legend makes much of them; hence, Saint Cecilia is the patron saint of music and musicians, and musical societies are very commonly called by her name: Dryden's fine ode, 'Alexander's Feast: a Song for Saint Cecilia's Day,' is an imperishable monument of the Cecilian legend in English literature.

Cecilia, a novel by Frances Burney, published in 1782. It is a typical English novel of a century ago. The plot is simple, the story long drawn out, the style stilted, and the characters alone constitute the interest of the book, and justify Dr. Johnson's praise of Miss Burney as "a little character-monger."

Cecomorphæ, sē-kō-môr'fē, one of Huxley's groups of schizognathous birds, now generally ranked as a sub-order or order, or split up in various ways among several orders. The palate has a narrow cleft on each side of the vomer, running the entire length between this bone and the palatines; the nostrils are usually narrow slits, but are sometimes tubular; the feet are always webbed, with three toes directed forward and the hallux small or wanting, and never connected to the other toes by a web. The *Cecomorphæ* are all aquatic birds, and may be subdivided into the *Pygopodes* or divers, and the *Longipennes* or long-winged swimmers. The former includes the following important families: *Alcidæ,* the auks, puffins, and guillemots (qq.v.); *Podicipedidæ* (q.v.), the grebes; *Heliornithidæ,* the sun-birds (q.v.); and *Colymbidæ,* the divers (q.v.). The *Longipennes* group includes two families, the *Procellariidæ* or petrels, albatrosses, and shearwaters (qq.v.); and the *Laridæ,* or gulls, terns, and skimmers (qq.v.).

Cecro'pia, a genus of plants of the order *Artocarpaceæ,* of which the best known species is the trumpet-tree (*C. peltata*) of the West Indies and tropical South America. It attains a height of about 50 feet, and has a hollow stem and branches, from which musical instruments are made. Its leaves are very large, circular, and peltate, and serve as food for sloths; and its flowers are small and grouped in short spikes, several of which are enclosed at first in a large bract. The wood is light and soft, and is employed by the natives in various ways, particularly for the purpose of obtaining fire by friction. Ropes are made from the inner bark, and the outer bark has astringent properties. Caoutchouc is obtained from the juice, and the buds are employed as a pot-herb. Ants utilize the hollow stems as dwellings.

Cecropia Moth, a colossal species (*Samia cecropia*) of the family *Saturniidæ.* The moth expands five or six inches and is brick-red in color, the wings tinged with grizzly, each wing with a large crescent-shaped spot near the centre, which is red and white, or white-edged with red and black; on the apex of each fore wing is a large, black, eye-like spot. The caterpillar is a large green worm three to four inches in length, protected by large tubercles colored green, blue, yellow, or red. It is not uncommon on the elder, willow, apple, currant, pear, thorn, poplar, etc. At the end of summer it spins a large cocoon, open at one end,—not oval, as in those of *Telea polyphemus* and the luna moth,—and attaches it to a branch of a tree. An allied species in northern Maine and Canada is *S. columbia,* while in the Rocky Mountain region, Colorado and Wyoming it is represented by *S. gloveri,* and on the Pacific coast by *S. californica.* The silk of this species cannot be used because its fibres are not continuous.

Cecrops, sē'krŏps, according to Greek tradition, the founder of Athens, and the first king of Attica. He was said to have been an autochthon (sprung from the soil), and was sometimes represented as half man, half dragon. He taught the savage inhabitants religion and morals, made them acquainted with the advantages of social life, and laid the foundation of the future city of Athens, which after him was originally called Cecropia. He is also said to have introduced the art of ship-building. He died after a reign of 50 years. By the later Greeks he was represented as having led a colony to Attica from Sais in Egypt about 1400 or 1500 B.C., but the best modern critics do not look upon this event, nor on the life of Cecrops at all as historical. There is no doubt that Egypt did have a certain influence on the development of civilization in Greece, but how great this influence was, or in what manner exercised, history does not furnish sufficient data to enable us to decide. It is probable that the true Cecrops was a hero of the Pelasgian race.

Cedar, various cone-bearing evergreen trees and their wood; also several non-coniferous trees. The most widely known are probably the cedar of Lebanon (*Cedrus libani*), the deodar, or goa-tree, of India (*C. deodara*), and the African or Mount Atlas cedar (*C. atlantica*). These three species are regarded by some botanists as mere varieties of the first-named species. They are large ornamental evergreen trees with wide spreading branches which give

them a form distinct from most other cone-bearing trees. They are sometimes planted in southern California and the Gulf States, and the last-mentioned species even as far north as Philadelphia, where it can stand the winter in sheltered situations. They are readily propagated by seeds, and thrive well in well-drained loamy soil. From ancient times their odorous, light-red wood has been used for fine furniture and interior house-finish. The white gum of the cedar of Lebanon, which oozes from the trunk and branches, was formerly employed in embalming, but the forests of this tree have become so much reduced that neither the resin nor the oil made from it are in commerce. The other species are most abundant, the deodar in India and the Atlas cedar in northern Africa. Their timber is widely used for fine cabinet work.

The red cedar (*Juniperus virginiana*) is a well-known very variable tree found from Canada to Florida, and westward to the eastern slope of the Rocky Mountains. It attains a height of about 100 feet; has a conical more or less spreading head with upright limbs; evergreen, spiny, pointed leaves, and brownish or bluish globular fruits covered with bloom. The wood is largely used for fence-posts. The white cedar (*Thuja occidentalis*) is also a well-known American tree found in wet ground from Maine to Florida, and westward to the Mississippi River. It attains a height of 70 to 80 feet; has erect spreading branches; thin and slender pendulous twigs; fragrant, glaucous, green leaves; and tiny bluish-purple cones covered with bloom. The trees are highly ornamental, and, being hardy, are general favorites in the north. The wood is especially useful in moist places. The name white cedar is often applied to the *Arbor vitæ*. The yellow cedar (*Cupressus nootkatensis*), a common tree on the Pacific coast from California to Alaska, is valued, in cabinet work and interior house-finishing, for its light-yellow wood, which takes a high polish. Like its relative mentioned above, it is often planted for ornament. In its home it often exceeds 100 feet in height. The best known non-coniferous trees that are sometimes called cedar are probably *Cedrela odorata* (see CEDAR, BARBADOES) and *Cedrela toona*, the Australian cedar. See TOONA; JUNIPER.

Cedar, Barbadoes, a tall tree (*Cedrela odorata*) of the natural order *Meliaceæ*. It is a native of the West Indies, where its wood is highly valued for making certain kinds of furniture, cigar-boxes, canoes, and shingles. It is also exported for the manufacture of lead pencils. It often attains a height exceeding 75 feet and a great girth. It bears pinnate leaves 10 to 20 inches long; pendulous terminal panicles of inconspicuous whitish flowers, followed by dehiscent fruits about half an inch in diameter, containing numerous flat-winged seeds. The bark, leaves, and fruits smell like assafœtida, but the wood is pleasantly fragrant. The tree is often planted for its ornamental qualities, especially along avenues. It thrives in southern California and in the Gulf States. Several of its relatives, especially *C. sinensis*, which is hardy as far north as Philadelphia, are also similarly used. See TOONA.

Cedar-apples, fungous outgrowths upon juniper and red cedar trees. They are caused by the parasitic fungus *Gymnosporangium macropus*. At first they appear like warts upon the smaller branches and twigs, becoming chocolate color or brown as autumn advances, and remaining attached and unchanged until spring, when they enlarge into horn-shaped, jelly-like masses that resemble sponge. At this time they produce their abundant spores which, as the masses become dry, are blown away by the wind and, alighting on apple-trees, produce rust on the foliage and other green parts. They will not germinate upon cedar or juniper, but require an alternate host, the apple, to complete their life cycle. For methods of control see APPLE (*Diseases*); FUNGICIDE.

Cedar-bird, the common American waxwing (*Ampelis cedrorum*), a bird found throughout North America, breeding from the latitude of Kentucky northward. In most localities it is only partially migratory. It is a beautiful bird of delicate unobtrusive colors, generally ashy-brown with a purple tint on the head, the front of which, like the throat, is black. The tail-feathers are tipped with yellow, and the wings are crossed by a white bar, below which are the peculiar red sealing-wax-like appendages. The head is gracefully crested. The cedar-birds spend most of the time in flocks, which wander according to the supply of food and are noteworthy for the uniformity with which all members alight or rise together. The food consists chiefly of berries when these are to be had, on which account they have received the name of cherry-birds in some sections. Nesting takes place late, when the summer is well advanced, and the rather bulky structure is usually placed in an apple or other orchard tree. The eggs are four to six in number, pale blue, and thickly speckled.

Cedar Creek, a stream in Shenandoah County, Virginia, flowing into the North Fork of the Shenandoah River.

Cedar Creek, Battle of. After the battle of Fisher's Hill, 22 Sept. 1864, Gen. Sheridan followed Early as far as Harrisonburg, his cavalry going as far as Port Republic, Staunton, and Waynesboro. In view of the difficulty of supplying his army so far from its base, and of other operations by which two corps of infantry and a cavalry division of his army were to be sent to the Army of the Potomac, he holding only the lower valley of the Shenandoah, Sheridan, after ordering the destruction of all mills, barns, grain, forage, and provisions of all kinds, began to withdraw down the valley on 5 October, and on the 8th recrossed Tom's Brook. His rear had been so persistently followed and harassed by the Confederate cavalry divisions of Rosser and Lomax that he ordered Torbert, his cavalry commander, to whip the Confederate cavalry or get whipped. On the morning of the 9th Torbert fell upon Rosser and Lomax, and in a two-hours' contest routed them, pursuing many miles and capturing over 300 prisoners, 11 guns, and 40 wagons. Sheridan then resumed his march, and on the 10th halted on the north bank of Cedar Creek. Wright's Sixth Corps continued its march to Front Royal, on the way to Washington, where it remained two days, and then marched toward Ashby's Gap, but was recalled to Cedar Creek, where it arrived on the 14th. Early had been reinforced by Kershaw's division and about 600 cavalry,

increasing his force to about 18,000 men, and under Lee's order to detain the Union troops in the valley he had followed Sheridan, arriving at Fisher's Hill, six miles from Cedar Creek, on the 13th. On the night of the 15th Sheridan left for Washington to consult with Stanton and Halleck, leaving Gen. H. G. Wright in command of the army. Sheridan's cavalry accompanied him to Front Royal, from which point he intended to push it through Chester Gap to the Virginia Central R.R. at Charlottesville and raid the country east of the Blue Ridge, but upon erroneous information that Longstreet was moving to join Early, the raid was abandoned and Torbert moved the cavalry back to Cedar Creek. On the night of the 18th Emory's Nineteenth corps was on the west side of the valley turnpike, on elevated ground overlooking Cedar Creek. Wright's Sixth corps in reserve to the right and rear of the Nineteenth, separated from it by Meadow Brook. Merritt's cavalry division was on the right of the infantry, and Custer's division 1½ miles beyond Merritt's, watching the crossings of Cedar Creek and the roads on the right. Crooks' Eighth corps was on the east side of the pike, one of its two divisions (Thoburn's) on a rounded, entrenched hill, one fourth of a mile in advance of the other, near the junction of the creek and river, and both somewhat in advance of the Nineteenth corps on the right. Two cavalry brigades of Powell's division were far to the left, near Front Royal, and one at Buckton Station, two miles beyond Crooks' left. The Union army numbered about 31,000 men. Reconnoissances were sent out daily from the flanks to see what Early was doing, and that of the Eighteenth reported that the indications were that he had retreated from Fisher's Hill. He had not retreated, but had matured a plan of attack. A reconnoissance by Gen. Gordon had disclosed the fact that the left of the Union line was lightly picketed, with but a small cavalry force on the North Fork of the Shenandoah, and that it was practicable to move infantry secretly by night across the creek, which was easily fordable, and through the woods to within less than half a mile of Crooks' left and rear. This plan Early adopted, assigning for the movement the divisions of Gordon, Ramseur, and Pegram, and Payne's cavalry brigade, all under command of Gordon. Early, with the divisions of Kershaw and Wharton and all his artillery, was to co-operate in the effort to crush the Union left and centre. Two brigades of cavalry were to demonstrate on the Union right, and Lomax's cavalry, moving by Front Royal, was to strike the valley pike in the Union rear. The movement began after dark of the 18th. Gordon led his column across the North Fork of the Shenandoah, down its right bank, and again crossing below the mouth of Cedar Creek, reached his assigned position before daylight. Early led Kershaw across Cedar Creek, midway between its mouth and the pike, and at the first flush of dawn, covered by darkness and fog, captured or drove in the picket line and rushed over the intrenchments held by Thoburn's division, at a point where they were not manned, surprised the camp, soon swept everything out of it, and captured seven guns, which were turned upon the fugitives. Kershaw then advanced on R. B. Hayes' division and Kitching's brigade, and at the same time Gordon charged out of the woods directly upon Hayes' left and rear, the combined attacks breaking his division and Kitching's brigade, and uncovering the left of the Nineteenth corps, which was now assailed by Kershaw and Gordon, while at the same time Wharton's division, moving swiftly down the pike, followed by 40 pieces of artillery, attacked in front, and the greater part of the Nineteenth corps, abandoning 11 guns, was swept from the field. Wright, who had foreseen at the beginning of the attack that his position was untenable, and a change of front necessary, now ordered the Sixth corps, under Gen. Ricketts, who was moving with two divisions to support the left, to fall back to some tenable position, and the Nineteenth corps was ordered to rally on the right of the Sixth. The Confederates followed up their advantage, taking many prisoners, but were checked by the Sixth corps, Wharton being badly repulsed. Early still pressed matters; it was now 9 o'clock, and Wright, losing six guns of his own corps, withdrew to a more favorable position one and a half miles north and west of Middletown, where he was joined by the cavalry brigade from Buckton and by Torbert, with the two cavalry divisions that had been ordered from the right to left of the infantry line; while the division commanders of the Sixth and Nineteenth corps were told the enemy would be attacked about 12, noon, as soon as an ample resupply of ammunition could be issued. Meanwhile Sheridan, who had arrived at Winchester on the afternoon of the 18th, was hastening to the front, meeting on the way a stream of fugitives, whom he ordered to turn back, as he intended to reoccupy the old camp that night. He arrived on the field a little after eleven o'clock, during a lull in the fight, after Wright had reunited the divisions of the Sixth corps, which had been fighting by themselves during the morning, and after the Nineteenth corps had been rallied and placed in line, also parts of the Eighth corps, the only part of the army seriously engaged being a division of the Sixth corps and the cavalry, tenaciously holding the valley pike, the key-point of the battle. Wright's disposition of the infantry was approved, and the only change made in the line was to send Custer's cavalry back to the right of the infantry. About one o'clock Early pushed forward his entire line, but was quickly repulsed, and then busied himself in collecting his stragglers, who were plundering the captured camps, getting his prisoners and captured guns and wagons back to Fisher's Hill, and throwing up a defensive line beyond the reach of the Union artillery. At four o'clock Sheridan saw a movement of Early's, which he thought indicated an attack, and ordered a general advance, the Nineteenth corps on the right, the Sixth on the left, with the Eighth following in reserve, Custer's cavalry on the right, and Merritt's on the left of the infantry. The movement developed into a left half-wheel, and after a very severe and obstinate fight, during which parts of the Union line were repulsed, again to go forward, was successful; the Confederate line was broken near its left, other parts of the line gave way, and soon the entire army fled in panic and disorder from the field and across Cedar Creek, Sheridan's infantry following as far as the creek, the cavalry continuing the pursuit three miles beyond and until after dark, capturing guns, wagons, ambulances,

and prisoners. Early, with but few of his men, rested at night in his intrenchments at Fisher's Hill, and at 3 o'clock next morning retreated to New Market, followed by Sheridan's cavalry as far as Woodstock. The 24 guns captured by Early were retaken, and he left in Sheridan's hands 23 of his own. The Union loss was 644 killed, 3,430 wounded, and 1,591 missing; of the latter 1,429 were sent as prisoners to Richmond. The Confederate loss was 320 killed, 1,540 wounded, and 1,050 missing. Early's offensive movement suspended for a time the transfer of any part of Sheridan's army to the Army of the Potomac; his defeat ended efforts on the part of the Confederates to invade the North by way of the Shenandoah valley. Consult: 'Official Records,' Vol. XLIII.; Pond, 'Shenandoah Valley in 1864'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. IV.; Sheridan, 'Personal Memoirs'; Keifer, 'Slavery and Four Years of War,' Vol. II.

E. A. CARMAN.

Cedar Falls, Iowa, a city in Black Hawk County, situated on Cedar River and on the Burlington, C. R. & N., the Illinois Central, and the Chicago & G. W. R.R.'s, 85 miles northeast of Des Moines. It is actively engaged in manufacturing, having a foundry, a pump factory, and mills turning out flour, oatmeal, paper, etc. A State normal school is located here. Pop. (1900) 5,319.

Cedar Keys, Fla., a seaport in Levy County, on the Gulf of Mexico, 118 miles southeast of Tallahassee. It takes its name from the keys surrounding the harbor. There is a lighthouse on one of the keys. The town has a large trade in pine, cedar (largely used for pencils), sponges, and fish. Pop. (1900) 739.

Cedar Lake, a lake of Canada, in the Saskatchewan district, a sort of expansion of the river Saskatchewan, receiving the waters of this large stream to pour them over the Grand Rapids into Lake Winnipeg. Between Grand Rapids and Cedar Lake is another expansion, known as Cross Lake. Cedar Lake is nearly 30 miles long, and where widest 25 broad; area about 312 square miles. Its depth of water is sufficient for the largest craft, except on the northwest, where the quantity of alluvium brought down by the Saskatchewan is rapidly filling it up. Both the mainland and the islands are well wooded with balsam spruce, birch, poplar, tamarack, Banksian pine, and cedar, the last growing on the shores of the lake, particularly the northwest, and giving it its name.

Cedar Mountain, Cedar Run, or **Slaughter's Mountain, Battle of.** On 8 Aug. 1862, Crawford's brigade of Bank's corps marched from Culpeper Court-house, eight miles to Cedar Run, to support Bayard's cavalry brigade, which was being driven back by Stonewall Jackson, who, with the three divisions of C. S. Winder, Ewell, and A. P. Hill, in all nearly 24,000 men, was advancing from Gordonsville to seize Culpeper. On the 9th Bank's entire corps, at Little Washington, was ordered to follow Crawford, and Sigel was ordered to march his corps from Sperryville to the same point. Banks joined Crawford at Cedar Run about noon and took position on elevated ground just beyond it, covering the road to Culpeper, Crawford's brigade and six companies of the 3d Wisconsin, of Gordon's, on the right of the road, partially concealed in woods. Gordon's brigade was held in reserve on the hither side of the stream. Across the road on Crawford's left was Geary's brigade; Prince's brigade was on Geary's left, and Greene's small brigade to the left of Prince and somewhat refused. Seven batteries of artillery were distributed on the plateau slightly in advance of the infantry. Banks had about 8,000 men. Jackson crossed the Rapidan on the 8th, and about noon of the 9th drove back Bayard's cavalry, and following, came under fire of the Union artillery and prepared for battle. Early's brigade was ordered to advance, keeping to the right and close to the Culpeper road, while Ewell led his two other brigades farther to the right along the slope of Cedar Mountain. Early advanced until he came under severe artillery fire, when he halted under cover of a small hill, and C. S. Winder's division and three batteries came up on his left, Campbell's brigade on the extreme left, then Taliaferro's, with Winder's brigade in reserve. While placing his batteries on and near the road Winder was mortally wounded by a piece of shell. It was now five o'clock, and Banks gave the order to advance and attack. The three brigades of Crawford, Geary, and Prince threw out skirmishers, drove in those of the Confederates, and the main line advancing became severely engaged. Early's right held its own against Prince, but on the Union right Crawford, advancing with great impetuosity, attacked and routed Campbell's brigade; then swung to the left, fell upon and (with the assistance of Geary) routed Taliaferro and shook Early's left. It was going hard with Early when Hill's division came up and, forming on his right and left, restored the fight, checked Crawford's further success, drove him and Geary back, and held Prince in check. Then the 10th Maine, of Crawford's brigade, which had been held in reserve, went forward on the extreme right, and in less than 10 minutes was compelled to retreat with a loss of nearly one half its men. At the same time a battalion of Pennsylvania cavalry charged down the road and was instantly driven back in disorder. Gordon's brigade came on the field as the 10th Maine was going out. In its advance it moved a little to the right of where the 10th Maine had been, and was met by the brigades of Branch, Archer, and Winder, with such a withering front and flank fire that it was badly cut up and parts of it driven, again to rally and go forward, but, under cover of the woods, Pender's brigade gained its right and rear, poured in a volley and drove it from the field. The artillery had now been withdrawn and the Confederates advanced. Prince's brigade fell back, leaving Prince and many of the men prisoners, and Greene, on the extreme left, who had not been seriously engaged, but had held Ewell's two brigades in check, was withdrawn. Night had now fallen, but Jackson, desiring to enter Culpeper before morning, gave immediate pursuit, and when 1½ miles from the field was checked by Banks' rallied troops and Rickett's division, which had come up from near Culpeper, followed later by Sigel. Gen. Pope also had arrived and assumed command. The Union loss was 1,759 killed and wounded and 504 missing. The Confederate loss was 1,338 killed and wounded and 31 missing. Pope and Jackson confronted each other on the 10th

and 11th, but on the night of the 11th Jackson retreated, abandoning many of his wounded, recrossed the Rapidan, and marched to the vicinity of Gordonsville. Consult: 'Official Records,' Vol. XII.; Ropes, 'The Army Under Pope'; Gordon, 'Army of Virginia'; Allan, 'Army of Northern Virginia in 1862'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. II. E. A. CARMAN.

Cedar Mountains, a mountain range in Cape Colony, extending nearly along the meridian of 19° E., for about 25 miles southward, beginning with lat. 32° S., and rising at some places to the height of 5,000 feet. Fine cedar-trees of gigantic size formerly covered these mountains, and still do so to a considerable extent. These mountains contain many Bosjesman caves.

Cedar Oil, an aromatic oil obtained from the American red cedar (*Juniperus virginiana*). It is used for scenting soaps.

Cedar Rapids, Iowa, city in Linn County, on the Cedar River, and on the Burlington, C. R. & N., the Chicago & N. W., the Chicago, M. & St. P., and the Illinois Central R.R.'s, 79 miles southwest of Dubuque. The city is regularly laid out and well built, and is the trade centre of the surrounding country. It contains large pork-packing establishments, and the river supplies power for numerous manufactories, including machine-shops and foundries, woolen-mills, breweries, carriage factories, extensive works for making agricultural implements, etc. It has waterworks, a high school, daily and weekly newspapers, public and Masonic libraries, and national banks. It is the seat of Coe College. The city is connected with the opposite bank of the river by a handsome bridge. Pop. (1900) 26,656.

Cedar, or **Red Cedar, River,** a river rising in the southern part of Minnesota and flowing southeast through the eastern part of Iowa to Muscatine County, where it turns southwest and empties into the Iowa River, after a course of about 350 miles.

Ce'dartown, Ga., a city and county-seat of Polk County, on the Central of Georgia and the East & W. R.R.'s, 108 miles northwest of Columbus. It is located in a fruit-growing and iron-mining region, and has foundries, machine-shops, etc. A trade in lumber is also carried on. Pop. (1900) 2,823.

Cedilla, sẹ-dil'la, a mark used under the letter c in French and Portuguese when the c stands before a, o, or u, to indicate that it is to be pronounced like the English s, not like k, as is usual before these letters. A c with the cedilla under it is written ç.

Cedrela, sĕd'rē-la, a genus of large timber trees, natives of the tropics of both hemispheres, giving name to the order *Cedrelaceæ*, which is now usually included in *Meliaceæ*. The species have evergreen, equally pinnate leaves, and small bell-shaped white flowers. *C. odorata* of Honduras and the West Indies yields bastard cedar. *C. australis* is a valuable Australian timber tree. *C. toona*, a native of Bengal, furnishes timber much like mahogany. The bark is very astringent, and has been found valuable in fevers, dysentery, etc. The flowers are used for producing a red dye. The bark of *C. febrifuga* is used against the intermittent fevers of Java.

Cedrelaceæ, sĕd-rē-lā'sē-ē, the mahogany family, a natural order of dicotyledonous plants, nearly allied to, if really separate from, the *Meliaceæ*. They are trees with alternate pinnate leaves and a woody capsular fruit. Different species yield mahogany, satin-wood, yellow-wood, etc. The typical genus is *Cedrela* (q.v.).

Cedric, a steamship of the White Star Line, a type of modern steamship construction. She was built by Messrs. Harland & Wolff, at Belfast, Ireland, and is constructed of steel. Her length is 700 feet; greatest breadth, 75 feet; and depth, 49 feet 4 inches. Her gross tonnage is 21,000, and her displacement tonnage 38,200. Her launching weight was 14,257 tons, and her dead-weight carrying-capacity 18,400 tons. She has nine decks and is built on the cellular double-bottom principle, with many water-tight compartments designed to render her practically unsinkable.

The Cedric is propelled by twin screws, driven by two sets of quadruple engines, to operate which eight double-end boilers are employed, each capable of working up to a pressure of 210 pounds to the square inch. The oval funnels which carry off the smoke and waste gases from her furnaces are 14 feet 3 inches by 11 feet in diameter, and the height from their top to the keel is 131 feet. While the vessel is not built for speed, she is yet capable of developing 17 knots an hour, a rate which enables her to cover the passage between New York and Liverpool in from seven to eight days.

Passenger accommodations are provided for 350 in the first saloon, 250 in the second saloon, and 2,000 in the steerage. With 335 in the crew, her total population, with all berths filled, will amount to 2,935. The saloon dining-room is situated on the upper deck and covers the extreme width of the vessel. The state-rooms include suites of bed-, sitting- and bath-rooms, and in the steerage there are to be found, besides the usual open berths, cabins with two, four, or six berths. The third-class passengers have the use of dining-, sitting- and smoking-rooms, and all parts of the ship are ventilated by electric- and steam-driven fans. Some idea of the ship's massive construction may be gained from the fact that some of her plates weigh as much as three tons, while her great stern frame contains over 50 tons of metal.

Cefalù, chā-fā-loo' (ancient CEPHALŒDIS), Italy, a seaport and episcopal city of northern Sicily, 39 miles east-southeast of Palermo. It is surrounded by an old wall and has a very picturesque site at the foot of a precipitous rock. The trade is not large, but an active fishery is carried on. Sardines are caught in abundance.

Cehegin, thā-ā-hēn', Spain, a town in the province of Murcia and 39 miles west-northwest of the city of Murcia, four miles east of Caravaca, on a declivity facing the south. It has numerous spacious streets, and two squares, lined with substantial houses and neat public buildings, comprising a parish church, three chapels, town- and court-houses, a prison, hospital, theatre, cemetery, and several schools. The manufactures include paper, cloth, soap, pottery, brandy, wine, and oil. There is also trade in grain, wool, hemp, silk, wax, cotton,

etc. In the neighborhood various quarries of jasper and variegated marble are wrought. Pop. 12,000.

Ceiling, the upper surface of a room. The word seems to have been suggested by the use of arched coverings for churches, and even for rooms, which prevailed in the Middle Ages, and was not unknown to the Romans. Arched ceilings among the Romans were known by the name cameræ or camera, the Greek origin of which seems to furnish an argument in favor of the view that the arch was known to the latter people. The camera was formed by semicircular beams of wood, at small distances from each other, over which was placed a coating of lath and plaster. In later times the cameræ were frequently lined with plates of glass, when they were termed vitreæ. But the ceilings most common among the Romans were flat, the beams, as in modern times, having been at first visible, and afterward covered with planks and plaster. Sometimes hollow spaces or panels were left between the planks, which were frequently covered with gold and ivory, or paintings. The arched ceilings of the Romans were commonly of brick or concrete covered with stucco, and were of three kinds: barrel vaults, groined vaults, and domes. The favorite ceiling in the East was the dome, that in the West during the Middle Ages, was the groined and ribbed vault. Modern ceilings are generally flat and are of plaster or wood. When the ceiling is divided into deep panels it is said to be coffered. See VAULTING.

Celakowsky, chā-lä-kŏv'skē, **Fran'tisek Lad'islaw,** Bohemian poet and philologist: b. Strakonitz 7 March 1799; d. Prague 5 Aug. 1852. He was destined for the pulpit, but from patriotic impulses declined to adopt that profession, and engaged in 1821 as instructor in a nobleman's family. In 1828 he became associate editor of the 'Quarterly Review for the Catholic Clergy,' published by the consistorium at Prague, and in 1834 editor of the 'Bohemian Gazette,' and of the 'Bee,' a literary journal. He also commenced a series of lectures on the Cechic language and literature, at the university of Prague. He lost both his situation as editor and that at the university, in consequence of a remark against the Emperor Nicholas. The Bohemian society for the propagation of science elected him a member in 1840. In 1842 he accepted a professorship of the Slavic language and literature, recently established by the king of Prussia for the benefit of his Polish subjects, at the university of Breslau. After the events of 1848, the Austrian government, which now sought for support from the Cechic nationality, offered him a professorship at the university of Prague. Of his numerous works, the following are most remarkable: 'Poems' (1822); 'Slavic National Songs' (1822–7); 'Lithuanian National Songs' (1827); a metrical translation of Walter Scott's 'Lady of the Lake' (1828); a translation of Augustine's 'De Civitate Dei' (1829–32); 'Echo of Russian National Songs' (1829); 'Echo of Cechic National Songs' (1840). One of his latest works was the 'Popular Philosophy of the Slavic Nations in their Proverbs' (Prague 1851). After 1835 Celakowsky was engaged in a comparative study of all the Slavic dialects, the fruit of which is given in part in his additions to Jungmann's Cechic dictionary. As a poet he is distinguished by the grace and *naïveté* of his popular songs.

Celandine, sĕl'an-dīn (*Chelidonium*), a genus of herbs of the natural order *Papaveraceæ*. The few species are natives of Europe, where they are widely distributed, and whence they have spread to other parts of the world. It is common in some of the older parts of the United States, having escaped from gardens. Common celandine (*C. majus*), which is most frequently seen, is an ill-smelling biennial or perennial plant with brittle hairy stems, pinnate leaves, small yellow flowers in small umbels, and slender two-valved pods. The plant has long been popular in old-fashioned gardens. It is easily grown from seed and produces abundant flowers all through summer. All parts contain an acrid yellow juice, for which the plant has been sometimes used in medicine, though it is now used practically only by the Eclectics. It is a drastic purgative, but its action is very irregular and difficult to control, and hence it has not been introduced into regular medicine because of its many inequalities.

Celano, Tommaso da, tōm-mä'sō dä chä-lä'nō, one of the reputed authors of the Latin hymn 'Dies Iræ': b. Celano, in the Abruzzi, toward the end of the 12th or about the beginning of the 13th century; d. Italy after 1250. He was one of the most devoted adherents of St. Francis of Assisi, and after the establishment of an order of Minorite friars on the Rhine was appointed keeper (custos) of the Rhine districts. In 1230 he returned to Italy. He wrote a life of St. Francis, and several hymns. His claim to the authorship of the 'Dies Iræ' seems now fairly well established, but is still disputed in favor of Matthäus Aquasparta (d. 1303), Cardinal Frangipani (d. 1294), and even St. Bernard, Gregory the Great, and others. His name is first mentioned in connection with the poem toward the close of the 14th century.

Celastraceæ, sĕl-ăs-trā'sē-ē, an order of polypetalous dicotyledons, consisting of shrubs and small trees, natives of southern Europe, Asia, America, Australia, etc., most of them of no great importance. They have generally acrid properties. The chief genera are *Celastrus, Euonymus,* and *Elæodendron.*

Celaya, sä lä'ya, Mexico, a town in the state of Guanajuato, on the Rio Laja, about 150 miles northwest of the city of Mexico. It has several fine plazas, handsome churches, among which is that of Our Lady of Carmen, a magnificent structure, and manufactures of cotton and woolen cloths, saddlery, and other articles. The burning of its bull-ring, on Easter Sunday, 1888, caused considerable loss of life. Pop. 22,000.

Celebes, sĕl'ĕ-bĕs or sĕl'ĕ-bēz, Dutch East Indies, one of the larger islands of the Indian Archipelago, between Borneo on the west and the Moluccas on the east, extending from lat. 1° 45′ N., to 5° 52′ S., and from lon. 118° 45′ to 125° 17′ E., remarkable for the singularity of its shape. It consists mainly of four large peninsulas stretching to the east and south, and separated by three deep gulfs. The total area of the island is a little over 71,000 square miles.

Celebes is high and mountainous chiefly in the centre and the north, where there are several

active volcanoes. The absence of extensive deltas, and the intervention of broad grassy plains between the forests, distinguish it from the other larger islands of the Indian Archipelago. All that is most majestic and lovely in these is thought to be concentrated in this island. It abounds in the most picturesque and varied scenery, and the most beautiful and magnificent tropical vegetation. Though cut by the equator, and wholly within the torrid zone, Celebes is considered remarkably healthful, the natives often enjoying a vigorous old age, and Europeans living longer than anywhere else in the East. Its extreme heats are tempered by the sea-breezes, by monthly rains, and by the north winds that prevail for part of the year. The east monsoon lasts from May to November, and the west during the remaining months. The soil generally consists of a bed of vegetable mold from 10 to 20 feet thick, on decomposing basalt. Gold is found in all the valleys of the north peninsula, which is often convulsed by earthquakes, and abounds in sulphur. Copper of good quality occurs at various points, and in Macassar tin also, as pure as that of Banka. Diamonds are sometimes found almost at the surface of the ground, and precious stones are carried down in the sand of the torrents. The island is entirely destitute of the large carnivorous animals and pachyderms. None of the cat kind are seen in its forests; nor has it the elephant, the rhinoceros, or the tapir. Deer and wild hogs abound, together with the babirussa and herds of antelopes. Pouched animals, unknown in the Sunda Islands, here first occur, and there is a black tailless baboon or ape. Among domesticated animals are found small but vigorous horses, buffaloes, goats, sheep, and pigs. Trepang and turtle are caught in abundance. Among the trees are the oak, teak, cedar, upas, bamboo, etc.; among plants requiring more careful cultivation, the coffee-tree, indigo, cacao, sugarcane, manioc root, and tobacco.

The maritime districts of Celebes are inhabited by Malays; the Peninsula of Macassar by Bugis and Macassars. Mandhars dwell in the west of the island, and the mountainous regions in the interior are inhabited by Alfurese. In the harbors also there are many Chinese and Oorang Badjus or Oorang Laut, a mixed race partly of Malay and partly of Battak origin, who live in their boats, and roam over the whole archipelago, gaining their livelihood by fishing. The natives are subject to several petty rulers, more or less dependent on the Dutch. The capital is the town of Macassar, in the southwest of the island, in the bazaar of which are sold all the products of the neighboring islands as well as of Celebes itself, among which are bamboo canes, sandal-wood, cajeput oil, nutmegs, rice, coffee, pearls, birds'-nests, trepang, birds of paradise, etc. The trade in trepang is very important, Macassar being the chief staple place for this article of commerce. The chief harbor of the north is that of Kema, on the east coast of Minahassa. The coffee of Menado is excellent, and is even preferred to the best Javanese coffee. A recent return states the number of coffee-trees in Minahassa at nearly 6,000,000 and the export of coffee at about 5,000,000 pounds. The harvest of cocoanuts is also considerable. A European controller superintends the cultivation of the coffee-tree in his own district, advises the village chieftains, acts as the protector of the natives, and negotiates between them and the Dutch government.

The languages and literature of Celebes differ essentially from those of the countries to the west. The letters of its alphabet are in form as unlike the Javanese as the latter are unlike the Arabic or Roman. The three great languages of the island, not reckoning the dialects of the savage tribes, are those of the Bugis, the Macassars, and of Mandhar. The modern Bugis is the most cultivated and copious; the Macassar is simpler, and its literature more scanty; both are distinguished for a soft and vocalic pronunciation. The Bugis have a considerable body of literature. The more civilized inhabitants profess Mohammedanism; but previous to the introduction of that faith, the Hindus had brought their religion to the island.

The island of Celebes was first visited by the Portuguese in 1512. In 1607 the Dutch entered into commercial relations with Macassar, and gradually acquired and extended control until, early in the 19th century, they made their supremacy complete. The population is estimated at nearly 2,000,000.

Cel'eres, a body of horsemen traditionally said to have been introduced by Romulus, and to have numbered 300, consisting of citizens rich enough to furnish a horse. They are also described as subdivided into three centuries, under the name of Ramnes, Titienses, and Luceres. The number of the centuries of the Celeres is said to have been raised to six by Tarquinius Priscus, this being the origin of the equites or knights, who in after times formed a separate class of citizens.

Celeriac, sē-lĕr'ĭ-ăk. See CELERY.

Cel'ery, a biennial or annual herb (*Apium graveolens*), of the natural order *Umbelliferæ*. It is a native of Europe, Asia, and Africa, in the older civilized parts of which it was cultivated prior to the Christian era. In nature the plants are commonly found in moist ground, where they attain a height of from 6 to 15 inches. They have numerous leaf-stalks odd-pinnate leaves, and branching leafy flower-stalks two to three feet tall and bearing many small umbels of small white flowers which give place to seeds (fruits) so small that 60,000 or more are needed to weigh an ounce. Cultivated celery does not differ in general characteristics from the wild plant, but by cultivation its leaf stalks (the part desired for the table) have been made more solid, less stringy, and more agreeably flavored. In many instances, too, they have been lengthened or increased in number, and made to form more compact plants. Celery is usually blanched and eaten raw with salt, but often it is used as a cooked vegetable, and its leaves, roots, or ground seeds are frequently used for flavoring. Celeriac or turnip-rooted celery is largely grown in Europe, but little in America. It does not require blanching, but is otherwise cultivated like celery.

Celery is usually started in unheated beds, and the young plants set out in the field when a few inches tall, after being transplanted once or sometimes twice. The soil best suited to the plant is a rich, friable, peaty loam well supplied with moisture, but well drained. As the plant is a gross feeder abundant manure must be given. Celery will, however, do well in any

moist, rich garden soil. In one method of growing, the plants are set about six inches apart in rows spaced from three to four feet, and the ground is kept loose and free from weeds by frequent cultivation, the plants being gradually covered with earth, or "earthed up," as they approach edible size, or they may be blanched by shading the stems with boards, straw, etc. In another method they are set closer together in the rows, which are rarely more than 12 inches apart. The size of the variety is a governing factor in the matter of distances; some varieties grow only 12 or 15 inches tall, others more than two and a half feet. In this "new celery culture" no earthing-up is necessary, as the plants blanch themselves. Summer celery is blanched quickly by the former method; autumn and winter celery more slowly. Indeed, the process is frequently continued in the winter storing quarters, which usually consist of specially constructed houses or cellars, the floors of which are covered with a few inches of earth, in which the roots obtain some food and water.

Celery is frequently attacked by parasitic diseases, but most of its insect enemies are controlled by parasites and rarely become troublesome enough to demand special attention. The chief fungous parasites are sun-scald or rust (*Cercospora apii*), which appears upon the leaves as yellow or gray blotches which enlarge and gradually destroy the whole leaf. It is more frequent on plants grown in dry soils. Leaf-blight (*Septoria petroselina apii*) appears on the leaves and stems as watery spots which become dotted with black spores. These parasites may be controlled by spraying with a standard fungicide (q.v.). Several other parasites are occasionally troublesome, but they can usually be similarly controlled.

In the United States the celery industry developed enormously during the closing quarter of the 19th century. From being restricted to the individual gardens and fields of market gardeners who grew it as one of their ordinary crops, it has in many localities become a specialized business, with machinery adapted to its particular needs. And from demanding only part of the time of the market gardener it now occupies the attention of hundreds of men in certain districts. In Michigan, California, and New York there are thousands of acres devoted to this crop, and from some of these districts hundreds of carloads of celery (even trainloads from California) are sent to Chicago, St. Louis, Kansas City, New York, Boston, Philadelphia, and other large distributing centres. Instead of having celery as a delicacy for a few weeks during autumn and winter, American tables are supplied throughout the year with this vegetable, which has risen to the rank of a necessity, a development due mainly to improvements in the management of the crop, but partly to improved transportation and storage methods.

In medicine celery enjoys a certain popular reputation by reason of the apiol which it contains. This has an action similar to that of many of the volatile oils, but in addition it dilates the blood vessels, particularly of the pelvic viscera and is, therefore, useful in disorders of menstruation, in chronic constipation, and disordered intestinal states in general. It is also diaphoretic and diuretic.

Consult Greiner, 'Celery for Profit'; Van Bochone, 'Kalamazoo Celery'; Hollister, 'Livingston's Celery Book'; Duggar and Bailey, 'Notes Upon Celery'; 'Cornell University Agricultural Experiment Station Bulletin' 132; Bailey, 'Cyclopedia of American Horticulture.'

Celeste, se-lĕst, **Madame,** French actress: b. Paris 6 Aug. 1814; d. there 12 Feb. 1882. A pupil at the Conservatoire, she early showed remarkable talent. She made her début in 1827 at New York, and during her residence in the United States married a Mr. Elliott. At Liverpool, in 1830, she played Fenella in 'Masaniello'; in 1831–3, she became extremely popular in London. Her second visit to the United States (1834–7) is said to have brought her $200,000. After her return she took part successively in the management of the Theatre Royal, Liverpool, and the Adelphi and Lyceum in London. Her imperfect English long confined her to non-speaking parts. She retired from the stage in 1874.

Celes'tial Empire, The, a popular name for the Chinese Empire, taken from the Chinese appellation for the country, "Tien Chao" (Heavenly Dynasty). Hence the name "Celestials," applied to natives of China.

Celestial Sphere, the skyey background on which all celestial objects appear projected. It is supposed to be of indefinite radius, with the observer at the centre. It is crossed by systems of imaginary circles which serve to fix positions upon its surface by means of spherical co-ordinates. See CO-ORDINATES.

Cel'estine I., Saint, a Pope memorable in the annals of the Church as having convoked the general council of Ephesus, 431; as having given to Palladius and Patricius mission to the Irish and the Caledonians, and as having checked the progress of Pelagianism and Novationism. Of his birth or his age there is no record, but he died in 431 and his day in the Roman calendar (that is, the day of his death) is 7 April: he occupied the see of Peter about eight years and a half. Celestine was represented in the Ephesine council by his legates, and at his instance the council condemned the heresy of Nestorius; and of his letters to bishops of various churches both in the East and the West, communicating to them the council's decrees, four are extant, namely: those to the African bishops and to the bishops of Illyria, of Thessalonica, and of Narbonne.

Celestine II., Pope (Guido di Castello): b. Tiferno, Tuscany; d. Rome March 1144. He had studied under Abelard, and succeeded Innocent II. in 1143. It was this pontiff who granted absolution to Louis VII. of France, and removed the interdict which for three years was laid upon that country.

Celestine III., Pope (Giacinlo Orsini): b. about 1106; d. Rome 8 Jan. 1198. He succeeded Clement III. in 1191, when, it is believed, about 90 years of age, and reigned till 1198. He crowned the emperor Henry VI. of Germany in 1191, but afterward excommunicated both Henry and Leopold, duke of Austria, on account of the captivity of Richard Cœur de Lion.

Celestine IV., Pope (Goffredo Castiglione): b. Milan; d. 22 Sept. 1241. When a monk at Hautecombe in Savoy, he wrote a history of Scotland. He was elected Pope in 1241, but reigned only 17 days, having died, it is said,

of poison before the ceremony of consecration was performed.

Celestine V., Saint, a Pope celebrated as the one occupant of the papal see who, his title undisputed and no demand made for his retirement, voluntarily and of his own motion abdicated the pontificate. He was a Neapolitan, born in 1215, and while a lad entered the order of Benedictines. From the first he practised the greatest austerities, and at the age of 24 years, for the sake of freedom in the pursuit of religious perfection, he quitted the monastery and adopted the solitary or eremitical life in a cave of Mount Morone, whence his surname, Peter di Morone. After five years spent in this solitude he, with two companion hermits, migrated to a similar cave in the Monte di Majella in Bruttium. Here disciples flocked to him in scores, and to these he gave a rule of life and thus laid the foundation of a new monastic order which later received papal approval; after the death of the founder the order assumed the title of Celestines. While Peter di Morone was, as superior-general, governing 36 communities of the new order comprising 600 monks, he was elected Pope 7 July 1294. He protested vigorously against this unexpected promotion, but at last was prevailed upon to assume the burden of the papacy. As Pope he promulgated two decrees, one re-enforcing the rule which requires that the cardinal electors of a Pope shall be strictly secluded in the conclave; and the other that a Pope may lawfully and validly lay down his office. At the end of five months and eight days he acted on this definition and abdicated, out of a desire, as he publicly declared, "for humility, for a purer life, for a stainless conscience, and in view of his lack of physical strength, his ignorance, the perverseness of the people, and his longing for the tranquillity of his former life." All eminently strong and good and honorable reasons, and worthy of the sincerely religious soul that was moved by them. His successor in the papacy, Boniface VIII., doubtless fearing lest the honest hermit should repent of his abdication and resume the papal title, made him a prisoner and confined him in a strong castle where he died, after languishing 10 months, 19 May 1296. Some commentators of Dante ('Inferno,' iii., 60) think that Celestine is the damned soul,

> Who to base fear
> Yielding, abjured his high estate,

(Cary's trans.), or as the verse is rendered by Longfellow —

> The shade of him
> Who made through cowardice the great refusal.

But as has been well remarked, "Dante knew better than to consign a man to eternal pain for having declined the path of ambition." Celestine V.'s day in the Roman calendar is 19 May, but he is there styled not simply Saint Celestine, but Saint Peter Celestine (Petrus Cœlestinus). His canonization took place 11 years after his death. See CELESTINES.

Cel'estine, in mineralogy. See CELESTITE.

Cel'estines, a monastic order of the Roman Catholic Church, a branch of the great Benedictine order. It was founded by Pietro di Morone, afterward Pope Celestine V. (q.v.). To Pietro di Morone, who was leading an eremitical life in a wilderness, so many men resorted for spiritual guidance that he was induced to form them into a religious community under a rule drawn up by himself. The institute was approved by Pope Urban IV. in 1264, 10 years after it had been founded, but not as an independent order, for it was made a branch of the Benedictines, under a rule based on the rule of that order. The mother house of the institute was on Monte Majella in the Abruzzi, and 30 years after it was affiliated to the Benedictine order its primacy was acknowledged by 36 establishments having 600 members. The founder now relinquished the office of superior-general and resumed his former eremitical life. After Pietro was made Pope Celestine the order, till then known as Hermits of Saint Damianus and popularly as Moronites, took the name of Celestines. The order spread throughout Italy and beyond the Alps to France, Germany, and Flanders: so strong was its French branch early in the 15th century that it obtained for itself from the popes bulls that made it in a measure independent of the superior-general. But in the 17th century the order was already in process of rapid decay, and in the 18th many of its establishments were dissolved by papal decree, and many more by the secular powers. The order is now extinct.

Cel'estite, a native form of strontium sulphate, $SrSO_4$, crystallizing in the orthorhombic system, and also occurring in fibrous and radiated forms. The crystals resemble those of barite, and are usually tabular or prismatic. They have a hardness of from 3 to 3.5, and a specific gravity of 3.96. Celestite is commonly white with a vitreous lustre, but it also occurs with a pronounced bluish tinge, from which circumstance it received its name. When found in quantity it is a useful source of strontium. Fine crystals of it occur in the limestone about Lake Erie. Other important localities are in Sicily, Hungary, England, Canada, West Virginia, and California. Varieties containing large amounts of calcium or of barium are called calciocelestite and barytocelestite respectively; and the mineral itself is often called celestine.

Cel'ibacy, the state of being unmarried; especially the voluntary single life undertaken by religious devotees and by some clerical orders, as those of the Roman Catholic Church. Paul (1 Cor. vii.) recommends virginity, without condemning matrimony. The Roman Catholic Church respects matrimonial chastity, but esteems virginity a higher virtue.

From the time of the apostles it became a custom in the Church for bishops, priests, and deacons to renounce matrimony at their consecration, and to devote themselves entirely to the duties of their office. One point only was disputed, whether clergymen were to be merely prohibited from marrying, or whether even those who were married before their consecration should be required to separate themselves from their wives. At the Council of Nice several bishops proposed that the bishops, priests, and deacons who had received the holy consecration, should be directed by an express ordinance to give up their wives. But Paphnutius, bishop of Upper Thebais, contended that cohabitation with a wife was a state of chastity. It was sufficient, he said, according to the ancient traditions of the Church, that men in sacred orders should not be permitted to marry; but he who

had been married before his consecration ought not to be separated from his lawful wife. As it became the general opinion that a clergyman could not marry, it soon became the general practice to refuse consecration to married men. By this means uniformity was effected. As for the bishops, it soon became a matter beyond dispute. When monachism had become firmly established, and the monks were regarded with veneration on account of their vow of perpetual chastity, public opinion exacted from the secular clergy the same observance of celibacy. Epiphanius assures us that by the ecclesiastical laws celibacy was commanded, and that wherever this command was neglected it was a corruption of the Church. The Council of Elvira commanded all bishops, presbyters, deacons, and subdeacons to abstain from their wives, under penalty of exclusion from the clergy. In the Western Church celibacy was rigorously required. Pope Siricius, at the end of the 4th century, forbade the clergy to marry, or to cohabit with their wives if already married. At the same time the monks received consecration, which increased the conformity between them and the secular clergy still further, and indirectly obliged the latter to observe celibacy. The Emperor Justinian declared all children of clergymen illegitimate, and incapable of any hereditary succession or inheritance. The Council of Tours, in 567, issued a decree against married monks and nuns, declaring that they should be publicly excommunicated, and their marriage formally dissolved. Seculars, deacons, and subdeacons, who were found to dwell with their wives, were interdicted the exercise of spiritual functions for the course of a year. In Spain, where many priests refused to conform to the requirements of the Church, the bishops were ordered to enforce celibacy upon their abbots, deacons, etc., once a year in their sermons.

As in other points of discipline, in this also the Greek Church dissented from the Roman. The (Trullan) Council of Constantinople, in 691, in its 13th canon, declares: "We hereby forbid anyone to refuse the consecration of a priest or deacon on account of his being married, and cohabiting with his wife after he has requested consecration. We will by no means be unjust to marriage, nor separate what God has united." This regulation is still in force. Celibacy is indeed required of the bishops and monks, but priests and deacons, if married before ordination, are allowed to continue in this state. They cannot marry after ordination.

The Roman Catholic Church, then, has retained celibacy as an old apostolical tradition, to which she has added the rule not to consecrate married men unless the wife enter a religious order. As no one has a right to demand to be consecrated a priest, the Roman Church has, by this addition, violated no one's right. Her position, therefore, is expressed by saying that, profoundly convinced that an unmarried clergy is best suited to her work, she admits to her ministry only those who voluntarily engage to lead a celibate life, and as long as she finds a sufficient number of such candidates she refuses to hamper her work by the employment of others. While, however, the Church persevered in commanding celibacy, she had to struggle with the opposition of those who among the clergy represented corruption. A reformer appeared in Gregory VII., who, in order to reform the discipline of the Church, was obliged to encounter simony and licentiousness in some of the clergy. The former he checked by opposing the emperor's right of investiture, and he enforced the laws of celibacy by new regulations. In the Council of 1074, at Rome, he ordered that all married clergymen and all laymen who should confess to them, hear mass of them, or be present at any divine service performed by them, should be excommunicated. This met with much opposition, but in spite of that Gregory succeeded, as he was supported by the most ancient and most undoubted canons. After Gregory's death the Church continued in the same course. Still the question of celibacy has continued down to recent times to be the subject of fresh agitations and contests. All through the first half of the 19th century there were periodical attacks upon this rule of the Church, in which almost every Catholic country of Europe was represented. These movements have occurred alike within the communion of the Church and among secular and political bodies. They have usually been inspired by concern for the welfare of the Church and for the character and perpetuity of its priesthood, but no result has thereby been gained in any alteration of the ecclesiastical discipline.

The rule of celibacy has been more strictly observed in the Roman Catholic Church since the Reformation than it was before. The far greater number of the Catholic clergy have continued to respect it. Among the reasons sometimes urged against requiring celibacy in the clergy is the scarcity of men willing to devote themselves to a profession which calls for such strict self-denial. This, however, is said to be not true in point of fact, since statistics show a marked increase in the number of candidates for the priesthood at the present time.

Cell, the primary element of the bodies of plants and animals. A cell is a microscopic portion or bit of protoplasm (q.v.) either with or without a wall, and with usually, probably always, a nucleus. Cells are originally more or less spherical sacs, and the protoplasmic contents is the cell, that is, its dynamic portion. The cell is the morphological unit of the organic world. The size of cells varies, but they are mostly microscopic, the sperm cell (spermatozoon) being even less than 0.003 mm. in diameter. The egg-cell — for all unfertilized eggs are simple cells — may, as in that of the fowl, goose, or ostrich, be several inches in diameter. The largest unicellular organisms are the giant plasmodia of the *Mycetozoa.* While the free cells are spherical, when they are united into tissues they may by mutual pressure form polygonal or prismatic bodies, or may send out spindle or star-shaped branching processes, or a nerve-cell may send out a long, fine nerve-fibre.

History of the Cell Theory.—The term "cell" was first used in the 17th century by Hooker, Malpighi, and Grew in writing of vegetable anatomy. They had in mind small chambers surrounded by firm walls and filled either with air or fluid. The English botanist Brown discovered the nucleus. Schleiden then framed his cell theory, laying emphasis on the nucleus. While his view was somewhat erroneous,

Schwann applied Schleiden's views to the animal world, and the cell theory was spoken of as the Schleiden-Schwann theory. From their point of view the cell-membrane was regarded as most important for the function of the cell; but, after that, the conceptions as to the true nature of the cell completely changed. It was seen that the protoplasm was the essential part of the cell. It was observed that it owed its origin to a previous cell, a living mother-cell. Hence Virchow's aphorism, *Omnis cellula ex cellula.* Then followed the discovery of protoplasm (q.v.) by Dujardin, Mohl, Schultze, and others, so that now the cell is regarded as a lump or bit of protoplasm.

Nucleus.—This is the central specialized portion of the cell, and the part in which reproduction begins. The nucleus may vary in shape in each kind of cell. While usually spherical it may be oval, club-shaped, bent into a U, or be branched. It also varies much in size, sometimes forming almost the whole of the cell, but sometimes so small as to be found with difficulty, and only by employment of a special technique. The substance of which the nucleus is composed is distinguished from protoplasm, besides other characters, by its greater coagulability in certain acids (acetic and chromic).

Structure of the Nucleus, Chromatin and Chromosomes.— A portion of the nucleus reacts to certain staining-fluids (carmine, hæmatoxylin, and safranin); this is therefore called "chromatin" (by some "nuclein"). The other substance, which does not stain, or only under special conditions, is called achromatin or linin. The chromatin forms a honeycomb structure (by other authors regarded as a network or reticulum) filled with a nuclear fluid, bounded externally by a nuclear membrane.

The chromatin enters into close relations with a less stainable substance, the plastin or paranuclein, also sharply distinct from achromatin. In the nuclei of *Protozoa,* plastin and chromatin are usually intimately united, the latter being embedded in the plastin. Both of these substances are usually so closely and regularly distributed as fine granules on the reticulum that the entire nucleus appears to be uniformly chromatic. The mixture sometimes collects into one or more special bodies called the chromatic nucleoli. The nucleolus is usually a rounded body (Hertwig).

In the *Metazoa,* or many-celled animals, the plastin (apparently not the whole, but a surplus) is separate from the chromatin. Thus there occur, in the nuclei of many eggs, nuclei which contain, the one chromatin, the other exclusively plastin.

Significance of the Cell Nucleus.— It is now well known that the seat of the reproduction process is in the nucleus. It has lately become apparent that the nucleus determines the character of the cell, and, again, that it is also "the bearer of heredity" (see HEREDITY). Within the nucleus the chromatin is now supposed to control the functions of the protoplasm, and therefore is the bearer of heredity, while the achromatin is the seat of contractility, and as such plays a part in cell-multiplication (Hertwig).

The Centrosome.— In addition to the nucleus there frequently occurs a special body in the protoplasm, called the "centrosome." It is supposed to be a derivative of the nucleus, either a part of the achromatin which has left the nucleus; or a second nucleus which by degeneration has lost the chromatin and retained only the active nuclear substance, the achromatin. The centrosome functions as a specific organ of cell-division which controls both the division of the nucleus and that of the cell itself. See KARYOKINESIS; MITOSIS; PROTOPLASM; REPRODUCTION.

Consult: Hertwig, 'The Cell'; 'A Manual of Zoology'; Wilson, 'The Cell in Development and Inheritance.'

Cell, a small chamber; the dwelling of a hermit; a lesser or subordinate religious house dependent upon a greater, by which it was erected, and under whose government it remained. The apartments or private dormitories of monks and nuns are also called cells.

Cell, in mechanics. See PEAUCELLIER CELL.

Cell Electrical. See BATTERY.

Cella, the windowless hall or central apartment of a Greek or Græco-Roman temple. This was often divided into two chambers of unequal size; the naos, in which was the statue of the divinity for whose worship the temple was built, and the thesauros or treasury. The cella was formerly supposed to have been roofless, or partially roofless, but later scholars believe it to have been lighted only through the doors or by artificial light. In the larger temples the roof was internally supported by the rows of columns in the cella, frequently in two superposed ranges.

Cellamare, Antonio Guidice, än-tō'nē-ō gē-dē'chā thäl-yä-mä'rā, PRINCE OF, Spanish ambassador: b. Naples 1657; d. Seville 16 May 1733. He was educated at the court of Charles II. of Spain, and took a prominent part on the Spanish side in the war of Succession. In 1707 he was taken prisoner by the Imperialists, and detained five years in Milan. On obtaining his liberty he returned to Spain, and in 1715 was appointed ambassador extraordinary at the French court. Here, having entered into Alberoni's scheme, he became head of a conspiracy for supplanting the regent, Philip of Orleans, and appointing Philip V. regent of Spain and France. The plot was discovered, and Cellamare was marched off under a guard to the Spanish frontiers. He was afterward made captain-general of Old Castile, and held the office at his death. A romance of Vatout, entitled the 'Conspiracy of Cellamare,' gives an account of the conspiracy with tolerable accuracy.

Cel'lar-snail, a species of land-snail (q.v.) (*Zonites cellaris*). It has been introduced from Europe, and has become common in cellars, hot-beds, and gardens of the seaport towns along the Atlantic coast. The shell is small, much flattened, thin, and has a large umbilicus.

Cel'lardyke, Scotland, a village on the southeast coast of the county of Fife, between Anstruther-Easter and Kilrenny. It is an eastern extension of the former, but is united as a royal borough to the latter. The inhabitants are chiefly engaged in or connected with the fishing industry; the village contains three fishing-gear factories and also oil-skin works. Pop. 1,662.

Celle, tsĕl'lĕ, or **Zelle,** a town in Prussia. See ZELLE.

Cellier, Alfred, English composer: b. Hackney, England, 1 Dec. 1844; d. London 28 Dec. 1891. He was the son of a French father and an English mother and from 1855 to 1860 was a chorister of the Chapel Royal, Saint James. In 1862 he became organist of All Saints' Church, Blackheath; at 20 he directed the Ulster Hall concerts at Belfast, and in 1868 was organist of Saint Alban's, London. He conducted at the Prince's Theatre, Manchester, 1871–5; and at the Opera Comique, London, 1877–9. Besides much music for orchestra and piano he composed among other operas: 'The Tower of London' (1875); 'Nell Gwynne' (1876); 'The Masque of Pandora' to the words of Longfellow's poem (produced in Boston 1887); 'The Sultan of Mocha'; 'Dorothy' (1886); 'The Mountebanks' (1892). The last named work was produced a week after its author's death.

Cellini, Benvenuto, bān-vā-noo'tō chĕl-lē'-nē, Italian sculptor, engraver and goldsmith: b. Florence 1500; d. there 25 Feb. 1571. Of a bold, honest, and open character, but vain and quarrelsome, and impatient of encroachment and dependence, he was often entangled in quarrels which frequently cost his antagonists their lives. He himself incurred great dangers, was put into prison, and was saved only by his boldness and the powerful protectors whom his talents as an artist procured him. His autobiography is a production of the utmost energy, directness, and racy animation. The vanity and self-satisfaction displayed throughout the work are excessive and highly amusing. It not only contains a very full information respecting his life and professional pursuits, his amours and hatreds, his passions and delights, his love of art, his extravagances, his self-applause and self-assertion, and describes all ranks of persons with whom he was connected during his strange career, but furnishes a very lively and doubtless a tolerably accurate picture of the state of society during the 16th century. This work has been translated in a masterly manner by Goethe into German. There are also English translations, Nugent (1771), revised by Thomas Roscoe (1822); and Symonds (1887). Among his other writings the most important are 'Due Trattati uno intorno alle Otto Principali Arti dell' Oreficeria l'altro in Materia dell' Arte della Scoltura' (best edition 1731). His 'Opere' were published at Florence in 1843. See Symonds, 'The Renaissance in Italy' (1885); Leader Scott, 'Sculpture, Renaissance and Modern' (1886).

Cell'ites, or **Alexian Brothers,** a religious order, so called from their patron saint Alexius, and from *cella,* tomb, from the fact that their life often leads to an early grave. The brotherhood arose in Mechlin about 1300, to check the ravages of the "black death," and soon spread through Germany, Brabant, and Flanders. At first the Cellites were merely a pious society, intended to harbor the poor and indigent free of charge, to serve the sick, and bury the dead. In 1469 they were organized as a religious order, and, favored by the popes, they established houses in many parts of Europe. In the United States, they have a hospital in each of the following cities: Chicago (founded in 1861); St. Louis (1869); Oshkosh, Wis. (1880); and Elizabeth, N. J. (1893).

Cel'luloid, an artificial substance extensively used as a substitute for ivory, bone, hard rubber, coral, etc., having a close resemblance to these substances in hardness, elasticity, and finish. It is composed of cellulose or vegetable fibrine reduced by acids to gun-cotton. To this, camphor is added, with the required coloring matter, and the mixture, after being condensed in cylinders, is then molded by heat and pressure into various useful and ornamental articles.

Cel'lulose, a chemical substance closely allied to starch, which occurs in all plants, and is the essential constituent of the walls of the cells. It is especially prominent in young plants, and with age it becomes more or less completely converted into lignin and other analogous products. Cotton fibres are composed almost entirely of cellulose, and such other substances as they do contain are readily removed by treatment with alkalis, alcohol, ether, etc. Cellulose has the chemical formula n ($C_6H_{10}O_5$), and is therefore a carbohydrate. In some respects, it is widely different from starch, but in others it resembles starch very closely. It may be said, in general, that the chemistry of all the substances that are intimately related to the starches, gums, and sugars is still very imperfectly known. Cellulose is specially remarkable for its insolubility and its chemical stability. It may be decomposed and caused to enter into combination with other bodies, but the only solvent known, which will dissolve it without destroying its chemical identity, is an ammoniacal solution of cupric oxide. From its solution in this menstruum, cellulose may be again precipitated in apparently unchanged chemical form, though in a physically amorphous condition. Unglazed paper (which is nearly pure cellulose) is converted, by the action of strong sulphuric acid, into a parchment-like substance that is known as vegetable parchment, or parchment paper. By the action of a mixture of strong nitric and sulphuric acids, cellulose is converted into a sort of nitrate, which is commercially known as gun-cotton (q.v.). Collodion is a solution of gun-cotton in a mixture of ether and alcohol. By the prolonged action of sulphuric acid cellulose is partially converted into glucose, and various other reactions are also known with sulphuric acid according to the conditions under which the experiment is made. When strongly heated out of contact with the air cellulose is destroyed, with the formation of acetic acid, methyl alcohol, and many other products. These transformations occur in the distillation of wood in the manufacture of wood alcohol. (See ALCOHOL.) It is probable that true cellulose occurs only in plants; but a substance that is closely analogous to it, and which is believed by some authorities to be identical with it, is found in the tissues of ascidia and other molluscous animals.

Cellulose as prepared from corn pith is now used to a considerable extent in ships of war, to prevent the entrance of water through shot-holes. For this purpose it is disposed within the steel hull along the water line, in the form of a belt some three feet in thickness. For several years a packing of cocoa fibre was used in this

way, but corn pith is now preferred, and is used on the Kearsarge, Alabama, Kentucky, and Illinois. The great superiority of the corn pith lies in the fact that as soon as the water reaches it the pith swells and automatically closes the shot-hole.

Celma, a Thessalian woman, who, with her husband, Celmus, was changed into adamant for denying the immortality of Jupiter.

Celman, Miguel Juarez. See JUAREZ, CELMAN.

Celsius, sĕl'sĭ ŭs, the name of a Swedish family, several members of which attained celebrity in science and literature: 1. MAGNUS CELSIUS: b. in the old province of Helsingland, 1621; d. 1679. He became professor of mathematics in the University of Upsal and published two works on the antiquities of his native province and was the discoverer of the Helsing runes. Besides mathematics and archæology, he cultivated poetry with some success, and was so skilled in practical mechanics that he himself made all the scientific instruments he required in his astronomical observations, etc. 2. His son, NILS CELSIUS: b. 1658; d. 1724; also filled the mathematical chair in Upsal University. 3. OLAF CELSIUS, another son of Magnus: b. 1670; d. 1756. He early became famous as an earnest student of the Oriental languages and of botany. He was successively appointed to the chairs of Greek, Oriental languages, and theology, and filled the office of provost of the cathedral at Upsal. He devoted a good deal of attention to the study of runology, and was among the first to recognize the genius of Linnæus, whom he liberally patronized. In 1745–7 he published his voluminous work 'Hierobotanicon,' a description of all the plants mentioned in the Bible. 4. ANDERS CELSIUS, son of Nils Celsius, and the most distinguished of the family; b. 27 Nov. 1701; d. 1744. After being appointed professor of astronomy at the University of Upsal, he traveled in Germany, England, France, and Italy; and in 1736 took part in the famous expedition that was undertaken by Maupertuis, Clairaut, Camus, and others, for the purpose of measuring a degree of the meridian in Lapland. For his services in this expedition he received a pension from the French king. He is best known at the present day as the constructor of the Centigrade thermometer. 5. OLAF CELSIUS the younger, son of the Orientalist and naturalist, and cousin of the preceding: b. 1716; d. 1794. He became Bishop of Lund, and devoted himself to history and poetry. His principal historical works are: 'Ecclesiastical History of the Kingdom of Sweden'; 'History of Gustavus I.'; 'History of Erik XIV.'.

Cel'sius Scale, the Centigrade thermometric scale. The name is from that of the inventor, Anders Celsius, who about 1741 attempted the precise graduation of thermometers. He took the melting-point of ice as 0°; and the boiling-point of water, under standard atmospheric pressure, as 100°. See THERMOMETER.

Cel'sus, pagan philosopher, an antagonist of the Christian religion in the second century. He is believed to have been the same Celsus, friend of Lucian, to whom is inscribed Lucian's satirical sketch of the life of the noted impostor and pseudo-thaumaturgus Alexander of Abonotichus, entitled 'Pseudomantis.' No work of Celsus has come down to us in its integrity or in its original form, but his 'True Discourse' is in substance preserved for us in the eight books of Origen's computation of the arguments brought by Celsus against the truth of the religion of Christ: Origen quotes textually long passages from the 'True Discourse' in his work 'Against Celsus.' From these passages it is seen that Celsus had accurate knowledge of the religious creed and practices, both of the Jews and Christians, and he skilfully puts in the mouth of a Jew his criticism of the life of Jesus as told in the gospels. Celsus himself appears to have been an epicurean and a scoffer at the supernatural, while his Jew is a firm believer in miracle, but for all that he cannot accept the gospel stories. He rejects the doctrine of the Incarnation of God, and reports a scandalous story of an amour which he offers as a substitute for the evangelists' narrative: and the fact Origen quotes the passage containing this shockingly blasphemous suggestion (as it must have been regarded by him) is evidence that the Christian polemist is dealing fairly with his antagonist. According to Celsus Jesus once visited Egypt and there learned the art of the jugglers; in his own country he easily won reputation as a wonder-worker, even a god. By his jugglery he might have made the multitude present at his immersion by John in Jordan believe that they heard a voice from heaven. If he was God, he would have made a better choice of apostles: why did he choose Judas? The story of the resurrection is self-contradictory. His death by crucifixion is undisputed and was a fact of public notoriety; if he rose from the dead, why did he not make that fact equally notorious and public? With such objections Celsus attacks the Christian faith in the first half of his work; in the second half he speaks in the person of a Grecian philosopher. Whatever is true and good in the Christian system exists already in the schools of philosophy: therefore let the Christians abandon their narrow sectarianism and separatism, and combine with all good and wise men in upholding the principles of good government. Celsus then advances philosophical arguments against the credibility of the Christian mysteries, in particular the Incarnation. God cannot assume a mortal body either in reality or in appearance only: not really, for that would be contrary to his nature; not in appearance, for that would be a fraud. But the idea of an incarnation of God is absurd: what could be gained by an incarnation? Certainly no advantage for God; but neither for men: do men know God better for seeing him in bodily form? Did God a little while ago waken from sleep and resolve to save a few men from sin, leaving the mass of mankind to go down to hell?

Celsus, Aurelius, or **Aulus Cornelius,** Latin writer on medicine who lived, probably, under the reigns of Augustus and Tiberius. He has been called the Roman Hippocrates, because he imitated the Greek physician, and introduced the Hippocratic system into Rome. He also wrote on rhetoric, the art of war, and agriculture. He is, however, best known as a medical writer. His style is elegant, and though concise, is very perspicuous. His work on medicine is an inexhaustible source from which other authors have

drawn materials. Eighty editions of his eight books 'De Medicina' have appeared; the first at Florence (1478). There is an English translation by Grieve (1756), and an edition, Latin and English, by Lee (1831). The edition by Védrènes (Paris 1876) contains a French translation.

Celtes, tsel'tes, **Konrad,** German humanist: b. 1459; d. 1508. His most celebrated work is a volume of 'Odes' (1513). He did much to promote the study of the classics, and wrote his own poems in Latin.

Celtiberi, a people of ancient Spain, supposed to have arisen from a union of the aborigines, the Iberians, and their Celtic invaders. Various limits have been assigned to their country, which included probably all the north of Spain as far south as the sources of the Guadalquivir. Hannibal subdued the Celtiberi, and they afterward passed under the Roman yoke. They revolted in 181 B.C., and were subdued by Tiberius Gracchus 179 B.C. Two struggles for independence followed, called respectively the first Celtiberian Numantine, and the second Celtiberian or Sertorian wars, in the latter of which they were finally vanquished, and after 72 B.C. do not again appear in history.

Celtic Church, the designation specially appropriated to the Christian Church founded in North Britain among the Celtic population by Ninian, Columba (Columcillé) and other Celtic apostles. Of these the most notable is Columba. He was a native of Ireland and a scion of the royal line of Niall and a kinsman of Conal, king of Ailbe or Albin, later called Scotia. Columba and all his companion missionaries to the Scots and Picts were monks, and the churches he and they founded, whether on the mainland or in the Western Isles, were essentially monastic in their form of government. In the Holy Isle, Iona, called also after the name of the Gælic apostle, Hy-Columcillé, which was the metropolis of Celtic or Gælic Christianity, Columba was arch-abbot of all the monastic communities and in effect, though not in order or title, bishop, primate and patriarch of that whole province of the Church Catholic. The system of Church government was not diocesan, and though there were bishops in Scotia they appear to have simply exercised their spiritual and sacramental powers in conferring orders and performing other rites. The government of the Celtic Church appears to have been administered only by the arch-abbot and his subject abbots. The Church spread, not by the erection of parishes, but by the planting of monastic houses, and a monastic community usually consisted of members of a clan, thus of kinsmen one of another. Columba himself had among 11 successors in the primacy 9 who were his kinsmen. These Gælic monks lived under a rule drawn up for them by men of their own race, but in imitation of the early rules of the eastern cenobites. The chief precepts of the Celtic monastic rule were poverty, chastity, obedience, and hospitality. The day of Easter was observed according to the Eastern cycle, and in this the Celtic Church of Scotland was at variance with the Latin Church. They had also some peculiarities in the mode of administering baptism. Columcillé came among the Scots in 563, being then aged about 40; he lived till the close of the century. From the end of the 6th to the end of the 8th century Hy-Columcillé or Iona was one of the most famous sanctuaries of western christendom; the Norse pirates laid Iona waste with fire and sword in 795; again in 802; and the ravages were repeated often afterward. Toward the end of the 11th century Margaret, queen of King Malcom Canmore, introduced into the Celtic Church of Scotland the usages of the Church of Canterbury in the observance of Lent and of Easter, in the celebration of the mass and other points of ritual; also she procured to be forbidden marriages between persons related by affinity. In these reforms she was aided by Lanfranc, Archbishop of Canterbury. The only monument of the ancient Celtic Church still extant in Scotland is (the insignificant ruins in some of the Hebrides not reckoned) the chapel raised in memory of the good Queen Margaret on the castle rock in Edinburgh. See IONA.

Celtic Languages, The. These constitute one of the seven or eight main groups comprised in the great family of Aryan or Indo-European languages: thus the Celtic is a sister language of Sanskrit, Old Persian, Armenian, Slavonic, Lithuanian, etc., as well of the Latin, Greek, Teutonic, and of the dominant modern languages of Europe. Within historic times Celtic speech prevailed throughout western Europe. As late as Cæsar's time it was the language of northern Italy, then known to the Romans as Gallia Cisalpina or the land of the Gael south of the Alps; and at that time Celts, Gaels or Gauls occupied the whole of the region lying west of the Rhine and part of Switzerland, besides the British Isles. But in time Celtic speech was wholly detruded from its seats throughout western continental Europe except the western extremity of France, and in the British Isles at the time of the Norman conquest it had disappeared from the whole southern half of Britain except Wales and Cornwall, and survived only in northern Britain, Ireland, Man and other isles of the Britannic group.

The language of these Celtic peoples, as well in antiquity as at the present time, presented dialectic differences sufficient to warrant a division of their common speech into two groups, the Gælic, now represented by the Celtic speech of Ireland, Scotland, and Man; and the Cymric or Kymric, represented by the Celtic speech of Wales and Brittany. Of these two groups the Cymric has best withstood the intrusion of alien speech, whether Romanic or Teutonic; and to this day a Cymric dialect of Celtic is the language of the people of Brittany and Wales; while of the provinces of the Gælic tongue, Scotland, with a population of about 4,500,000, has not in the mainland or in the isles more than 300,000 persons who speak or understand Gælic; and in Ireland in 1900, when the population was 4,500,000, the speakers of Gælic were but 700,000, a decline of 50,000 from their number 10 years before. This decline is due to the large emigration in the last few years from the western province, the last foothold of Gælic in Ireland. But the people of Ireland and the children of Ireland abroad are now making a concerted effort to resuscitate the ancient speech of their race and to make it again the home-speech of the people, concurrently with English. High hopes are entertained of the success of this movement, which purposes a revival, not only of the Gælic speech but of Celtic art, and music,

and literature. It is a struggle for the supremacy of Gælic ideals in the spiritual life of the people. In 1902, in a convention of the Gælic League in Dublin, 475 branches of the League were represented. The membership of the branches amounted to 50,000. Gælic is now taught in 1,600 schools in Ireland, and there were that year several Gælic periodicals, and nearly every newspaper in Ireland had a column or a page printed in Gælic. There were 600 Gælic literary and musical compositions entered in a prize competition held at Dublin during the convention, to which resorted thousands of visitors from all parts of Ireland and from abroad. Such competitions have long been held by the Cymry of Wales.

The Celtic speech of the Britons, now represented only by the Cymric of the Welsh, was formerly the language of the inhabitants of Cornwall and of Strathclyde also, and it is closely akin to the Armoric, or language of Brittany. In the last quarter of the 18th century died the last person for whom the Celtic speech of Cornwall — the Cornish — was a living language. Very scanty remains exist of the poetry of the Celtic inhabitants of Cornwall. What treasure of poetical compositions or of mythic history may have been held in the memory of their bards or of the people is lost, with the exception of five or six poems in the vein of the mysteries of mediæval times, namely: The 'Poem of the Passion,' a versified account of the life of Jesus Christ in the "holy week" — it is probably of the 15th century; 'Ordinalia,' a dramatic trilogy, the first member of which recounts man's history from the creation to the deluge, and then presents the story of Moses, of David, and of the temple of Solomon. The poet or dramatist has no regard for chronology, and makes the temple the theatre of the martyrdom of the Christian virgin Maximilla by the bishop in charge. The second member of the trilogy represents the life of Christ from the temptation by the devil to the crucifixion. The third is a free version of the story of the resurrection and ascension of the Lord, with a supplementary act representing the death of Pilate as told in mediæval legends. Dramatic unity is obtained by interweaving a myth regarding the wood of the cross, a favorite extravaganza of mediæval fancy. Another play is 'The Life of Saint Meriasek' written in 1504, a jumble of historical and traditional personages and occurrences crowded together with no regard whatever to chronology or probability or even possibility. But in the tangle are found some passages of considerable literary merit. Besides these dramatic pieces there survive a few songs, proverbs, epigrams, and the like, and the tale of 'John of Chy-an-Hur,' a favorite folk-tale.

Welsh, or Cymric (Kymric), the language of the Cymry or Kymry, is both a living language and has a literature of considerable volume and of no mean literary value. A few of the peculiarities of Cymry speech which distinguish it from the kindred speech of the Gæl, as regards the phonology, are that in Welsh p (labial) answers to c (c hard, equal to k) in Gælic; *e.g.*, Welsh *pren*, tree, *petguar*, four, *plant*, progeny, answer to Gælic *crann*, *cethir*, *cland*, respectively; or, Welsh *nep*, *map*, *paup* to Gælic *nech*, person, *mac*, son, *cach*, each, respectively. Even proper names from Gælic sometimes undergo this change on coming into Cymry speech: *e.g.*, the celebrated Irish saint, Kiaran (Ciaran, the c being always equal to k) is in Cymric Piaran; but conversely the word *Pasch* (Pascha, passover) is in Gælic *casg*, and Latin *purpura*, allied to Gr. *pyr* or *pur* and to Eng. *fire*, is in Gælic *corcur*. Answering to Gælic *iasg*, which is Gr. *ichthys* and Eng. *fish*, Welsh has *pysg*, as Latin has piscis (c=k). In Cymry the sibillant *s*, preserved in Gælic, Latin, etc., is often displaced by *h*, as is the case in Greek also, *e.g.*, Eng. salt, Lat. *sal*, Gæl., *salann*, but Welsh *halen*, Gr. *hals*. Other differences of this sort between Welsh and the sister language Gælic might be instanced, but these suffice.

Many Welsh MSS. from early times are extant — poems and prose romances chiefly, and they relate to the period of the Roman occupation, of the wars with the Sassenach, and the wars with the kindred Gæl, or they are collections of proverbs or are religious poems. Probably the most ancient of these compositions do not date from an earlier period than the 13th century, though doubtless they are based on and inspired by bardic and other pieces retained through generations in folk-lore. Among the Cymry, as among the Irish Gæl, the bardic order was recognized as a sort of priesthood and was held in the highest respect, the bard enjoying many special privileges. Thus, in the Laws of Howel Dda (Howel the Good), composed in metre according to primitive usage in all lands, the provisions made for the bard are thus expressed:

> In case of fighting the Bard shall play the 'Monarchy of Britain' before the battle.
> His land shall be free; he shall have a horse from the King.
> He shall have a harp from the King and a gold ring from the Queen. The harp he shall never part with.

Most of the ancient poetry is attributed to the bards Taliessin, Aneurin, Llwywarch, Hen, and Myrddin (or Merlin).

For many hundred years the Cymry in Britain were engaged in a deadly struggle with invading races — the Romans, the Gæl, both Scots and Irish, the Sassenach, the Normans, and the English, being pressed back to the West till finally they were conquered and "pacated" in the time of Henry VII. All this time the Cymry bards and chiefs and people kept alive the lamp of learning and cherished the highly imaginative poetry of their seers; and it is a curious fact that among the remains of their early literature still extant are no fewer than 30 treatises on Cymry grammar and prosody, the most notable of these dating from about 880. It was revised in 1200. The authorship of most of the ancient books as well as the dates are problematical, but the dates assigned by the general consent of Welsh scholars to the principal poets are: Aneurin, 510–60; Taliessin, 520–70; Myrddin or Merlin, 530–600. Some of the poems attributed to these three and others are undoubtedly spurious, and so proved to be on chronological grounds. Thus, though the three poets named lived *ex hypothesi* not later than the beginning of the 7th century, in the works attributed to them are found allusions to theological conceptions and use of theological terms which were unknown till four or five centuries later. The Bible was translated into Welsh in the 16th century by Bishop Morgan, and that was doubtless a powerful agent in preserving in its purity

among the common people their ancient mother tongue.

The Gælic speech of Ireland and Scotland has a very peculiar phonology, specially in the "aspiration" and "eclipsing" of consonants. This aspiration, as defined by O'Donovan, is "the changing of the radical sounds of the consonants, from being stops of the breath to a sibilance, or from a stronger to a weaker sibilance." But however correct that definition may be, it gives not to one who has no acquaintance with Gælic any conception of the effect of what is here called aspiration. A few examples will better show what this peculiarity of Gælic speech is. In Irish Gælic, and in Scots Gælic also, though perhaps some differences exist between the two dialects in this respect, the consonants that are subject to this phonetic change are b, c (*always* = k except when "aspirated"), d, f, g (always hard with the same exception), m, p, s, and t. The aspiration is denoted, whether in MS. or in print, by a point over the letter, *e.g.*, ċ, or by a h after, *e.g.*, mh. The effect of aspiration is to change the b and also the m (bh, mh) to v or w, or to a sound between v and m; example, *ard*, high and *bearna*, gap, give not *ard-bearna* (ardbarna), but *ardbhearna* (Ardvarna). Similarly Baile-an-mullaich, the *m* being changed to mh, with the sound of *w* becomes in pronunciation Ballinwoolly: the word is the name of a town and is made up of *baile*, town, *an*, of the, and *mullaigh*, possessive case of *mullach*, summit. The aspirated *d* and *g* are in sound about equivalent to *y* in *year*; example: Annayalla fairly well represents the pronunciation of Eanaigh-gheala. When aspirated, *f* is not sounded at all; example: Cnoc-an-fhraoigh, pronounced Knocan-ree. P aspirated is equal to f: baile-an-phoill, pronunciation, Ballinfoyl. The s and t aspirated are equal to h; example: drum-shamhuin is Drumhawan, and Drumhirk fairly represents the pronunciation of drumthuirc. To illustrate the process of eclipsis, "suppression of the sounds of certain radical consonants by prefixing others of the same organ" — a process to which are subject the consonants *b, c, d, f, g, p, s, t*, each of which has a special eclipsing letter of its own, one illustration, the eclipsing of *b* by *m*, must suffice: the place-name mullanamoya (or as it is written, Mullaghnamoyagh) represents Mullach-na-mboitheach: here the representation of the sound of the word in English is almost as cumbersome as in the Gælic.

Nearly all the remains of ancient Gælic literature, and they are comparatively very voluminous and intrinsically valuable, are of Irish origin, the documents written in the Scots and the Manse dialect being of little or no importance. There exists no evidence that in the Middle Ages there were anywhere, in Scotland, schools or academies or any body of scholars, bards or legists such as existed in Ireland as early as the 6th century; and no document in Gælic or in Latin, and of Scotch origin has come down to us of earlier date than the 'Book of Deer,' which appears to have been penned in the 9th century, and which contains only "a few notes or memorials" in Gælic, while the body of the book is in Latin containing the gospels in Jerome's version. The Gælic poetry of Scotland, as preserved in the memory of the people of the highlands and collected in recent times are the only literary monuments extant of ancient Scotch bardism. The following verses are found in one of those collections. They show the "aspiration" of consonants as in the Gælic of Ireland.

Tamhull mòr, mac sheann Tamhuil,
(Great Taval, son of old Taval)
Cha ruigeadh a'mhuir mhòr a ruinse,
(The great sea wouldn't reach his middle)
Cha thàrudh e mach, 's cha thàradh e steach,
(He couldn't get out and he couldn't get in,)
'Us 'n uair a bhitheadh e 's a bheul fodha,
(And when he lay down on his face)
Bhitheadh a dhruim a' sgriobadh an athar.
(His back would be scratching the sky).

There are extant fragments of Gælic writing penned in the 8th and 9th centuries, namely Gælic glosses appended to Latin MSS. Among these the canons of an Irish synod held in 684 and some passages from a sermon in Gælic. In libraries in many continental European countries are many Gælic texts of early times; but in the library of Trinity College, Dublin, and in that of the Royal Irish Academy, in the Bodleian at Oxford, and in the British Museum, are treasured monuments of a very copious Irish Gælic literature, by good fortune rescued from the destruction which has overtaken the great mass of Ireland's literary product during the "dark ages" of European history. According to their contents these MSS. are classed as histories, annals, biographies, pedigrees, mythological stories, fairy tales, hero stories, religious and devotional writings, lives of saints, lyric poetry, satire, many of the hero tales and myths being in poetical form. Treatises on law (Brehon law) are numerous and there are also medical treatises and some works on natural science. As among the Cymry, so among the Irish Gæl, the bards and the possessors or professors of the liberal arts and of the *arcana* of science human and divine, were a privileged class. As early as the 6th century the liberal professions were well organized, and the schools of Ireland were already sending out graduates of *Ecna, Filidecht,* and *Fenechas*, wisdom (or philosophy), poetry and divination — the schools of the *Filidecht* were "schools of the prophets" — and law.

Ireland became in the darkest of the Dark Ages, the 9th, 10th, and 11th centuries the sanctuary of learning, and to her schools students flocked in thousands from Gælic and Saxon Britain and from the continent, while Irish missionaries carried abroad to the banks of the Rhine, the Elbe, and the Danube, and to the Swiss in their mountains, with the cross, the lamp of learning. The profession of a Fili being a highly privileged one, and the Fili being numbered by thousands, the poetical and imaginative literature of Ireland was exceedingly voluminous, and though most of it has perished, a very considerable portion remains. Of special value are the numerous glossaries, which have been the means, in the hands of modern scholars, of reconstructing the vocabulary of the language. It is estimated that were the words of all the glossaries collected they would add 30,000 to the words contained in the printed dictionaries of the language. In one of these glossaries, dating from before the year 903, is seen an essay in comparative linguistic, Gælic words being traced in their relations to the Greek, Latin and Hebrew, the British and the Norse. Very numerous are the remains of Gælic historical or annalistic writings, and of biography, especially lives of saints: there are the annals

compiled before 1088 by an Abbot of Clonmacnoise; the so-called 'Annals of Ulster,' collected toward the end of the 15th century; the 'Annals of the Four Masters,' a compilation made indeed as late as the first half of the 17th century, but which embodies a great number of annals dating from much earlier periods, and which are now lost. The hero-tales relate mostly to the earliest period of which the memory was retained in the traditions of the Gælic race — the times of the invasion of Cymric Britain and of Caledonia by the Gæl of Eire or Erin, or to the wars at home with the tribes known as Nemed's people (Nemesians), Fomorians, Firbolgs, Tuatha, DéDanann, all of them rivals of the Milesian Gæl. To the legendary story of these wars belong the mythic heroes Finn MacCumhaill (son of Cumhall); Finn's son Oisin (the Ossian of Scots Gælic, as he is also of Irish Gælic myth); Niall of the Nine Hostages, a figure that stands upon or within the threshold of veridical history; he met his end in an invasion of Cymric Britain in 405. Of other extant poetical compositions founded on the legendary or the real history of the times between the 5th and 11th centuries are: A metrical life of St. Patrick by Fiacc, a bishop; an elegy on the death of the renowned St. Columcillé or Columkill, apostle of the western Scots (d. 597): the antiquity of this elegy, the extant copy of which was made about 1100, is proved by the fact that its language was in the 11th century so obsolete that it had then to be glossed and accompanied by grammatical notes. Of this class of legendary or historical poems there is a long list. Prose romances of history came into vogue in the 11th century: in these are glorified the deeds of the Gælic heroes of the long struggle with the Danes or Norsemen who for 200 years had been making settlements on all the coasts of Ireland: in them was chiefly celebrated the battle of Clontarf, 23 April 1014, in which a great and decisive victory was won by King Brian Boroihme (pronounced borúĕh) — Brian of the cow tribute. There are in collections of Gælic MSS. treatises on the medical art — an art which appears to have been hereditary, in certain families, who assumed as surname a word denoting the art or its professors, for example, O'Liagh (pronounced oléĕh), equivalent to leechson or descendant of the leech; O'Hiceadha, O'Hickey, descendant of the healer. Treatises on the Brehon law or Gælic system of jurisprudence are numerous, the MSS. dating from the 14th and 15th centuries.

JOSEPH FITZGERALD.

Celtic Literature. See CELTIC LANGUAGES.

Celtic Peoples. See CELTS.

Celtis, a genus of trees of the natural order *Urticaceæ,* closely related to the elm. *C. australis* is the nettle-tree. See NETTLE-TREE.

Celts, or Kelts, the earliest Aryan settlers in Europe according to the common theory. They appear to have been driven westward by succeeding waves of Teutons, Slavonians, and others, but there are no means of fixing the periods at which any of these movements took place. Herodotus mentions them as mixing with the Iberians of Spain. (See CELTIBERI.) At the beginning of the historic period they were the predominant race in Britain, Ireland, France, Belgium, Switzerland, north Italy, Spain, and elsewhere. The Romans generally called them Galli, but also Celtæ. They appear to have reached the zenith of their power in the 2d and 3d centuries B.C. Some tribes of them, overrunning Greece, crossed over in 278 B.C. to Asia Minor, and subsequently the name of Galatia was given to the country where they settled, from their name in Greek — *Galatai* (*Keltoi* being also used). They finally went down before the resistless power of Rome, and either became absorbed with the conquering races or were cooped up in the remotest parts of their former domains. At an early date the Celts divided into two great branches, speaking different though allied languages. One of these branches is the Gadhelic, Goidelic, or Gælic, represented by the Highlanders of Scotland, the Celtic Irish, and the Manx of the Isle of Man; the other is the Brythonic or Cymric, represented by the Welsh, the Cornish, and the inhabitants of Brittany. The Cornish dialect is now extinct. The sun seems to have been the principal object of worship among the Celts, and groves of oak and the remarkable circles of stone, commonly called "Druidical Circles," their temples of worship. Celtic art is known to us chiefly in the many ornamented articles in bronze and other metals which have been preserved, and in several splendidly illuminated manuscripts of the gospels. The earlier specimens are characterized, among other things, by a predominance of elliptic curves and diverging spirals, and their style seems to have been of purely British origin and use. The introduction of Christianity led to a great advance in the ornamentation of metal and other articles, but the chief relics of Christian Celtic art are the magnificent manuscripts above referred to. Their dates range from the 7th to the 9th century, and the finest of them are the 'Book of Kells' (Trinity College, Dublin) and the 'Lindisfarne Gospels' (British Museum). See also ETHNOLOGY; GAEL; GAUL; IRELAND; PHILOLOGY; SCOTLAND; WALES.

Bibliography.— Logan, 'The Scottish Gael' (1855); Pritchard, 'Eastern Origin of the Celtic Nations' (1857); Thébaud, 'The Irish Race' (1873); Beddoe, 'Races of Britain' (1885); Roemer, 'Origins of the English People' (1887); Brinton, 'Races and Peoples' (1890); Ripley, 'Races of Europe' (1899); Rhys and Jones, 'The Welsh People' (1900); Deniker, 'The Races of Man' (1900).

Celts, sĕlts, ancient weapons or implements of stone or bronze, found over nearly the whole surface of the earth. The derivation of the word is uncertain, though a very likely origin is to be found in the Welsh cellt, meaning "flint." There seems to be no reason whatever to connect the word with the name of the Celtic people. Stone celts are popularly believed in many countries to be thunder-bolts. Hence in different parts of Great Britain they are known as "thunder-axes," "thunder-bolts," etc.; and they are still, or have been known by similar names in France, Germany, Italy, Denmark, Greece, Japan, Burma, and numerous other places. Even the learned did not refuse their countenance to this vulgar error. Connected with this curious belief as to the origin of these stones, there were various superstitions almost equally widespread, such as those regarding their efficacy against lightning and their medicinal virtues. Somewhat similar beliefs were connected with the equally common

flint arrow-heads. Stone celts are found in the form of hatchets, adzes, or chisels. Some are only about an inch in length, while others approach two feet. The most common length is from six to eight inches, and the breadth is usually about one half or one third of the length. The materials of which they are made are flint, chert, clay-slate, porphyry, various kinds of greenstone and of metamorphic rocks, and, in short, any very hard and durable stone. Some are found merely chipped into shape; others have the edge ground and polished, although the other parts are merely chipped; and there are others which have the whole surface ground and polished. These stone celts belong to the Stone Age of archæologists, the ruder class being regarded as taking their origin in the earlier or Palæolithic Period, the more perfect in the later or Neolithic Period; while the bronze celts belong to the much more recent Bronze Age. Celts that are merely chipped appear to be more common in flint than in any other material. Two good reasons are given for this: first, that most other stones are more easy to grind than flint, and second, that it is more easy to give the proper form to flint than to almost any other stone merely by chipping.

There were two chief methods by which stone celts were attached to their handles. One was to insert the celt tightly in a hole made in the handle. The other was to insert the handle in a hole in the celt. Celts which have such holes to admit the handle are called perforated celts, and many axe- and hammer-heads have been found of this form. Sometimes, instead of a hole being cut right through the handle for the admission of the stone, there was merely a socket made in the wood, in which the celt was firmly fastened by means of some kind of binding. Instead of wooden handles, stags' horns seem often to have been used, and such are sometimes found with sockets at the end, evidently intended for the reception of small celts.

At various places remains have been discovered which indicate pretty clearly that at these spots the manufacture of celts was anciently carried on. Evidences of the existence of such manufactories are to be seen in the neighborhood of the Pfahlbauten of Moosseedorf in Switzerland; at the confluence of the Leochel and the Don in Aberdeenshire; at Cissbury, near Worthing; at Grime's Graves, near Brandon; at Spiennes, near Mons, in Belgium, and many other places. At the last-mentioned place the manufacture was carried on on a very large scale, and the shafts and galleries which were excavated in order to procure the flint necessary for the manufacture are still to be seen. Sometimes, however, the manufacture was carried on at places where the flint or other material out of which the celts were made was not to be had; such, for example, as the one mentioned in Aberdeenshire, and this proves flint to have been among the earliest articles of commerce. The blocks of flint were evidently imported as raw material to those manufactories, and then exported again in the form of manufactured celts. The remains found at these ancient manufactories leave little doubt that the process of manufacture must have been much the same as that by which gun-flints are still manufactured.

Bronze celts belong to a later period than stone ones, and are not so numerous. Some stone celts, however, have been found along with bronze celts in such a manner as to show that stone celts were still used when the method of working bronze had been discovered, a circumstance that need not be wondered at. Bronze celts are not found so large as the largest stone celts, the largest bronze celt being under 12 inches; but the average size of a bronze celt is about the same as that of a stone.

Stone celts are also found in various parts of the United States, flint and obsidian being largely used in the manufacture of cutting instruments. (See MOUND-BUILDERS.) On the subject of stone celts, consult Evans, 'Ancient Stone Implements of Great Britain.'

Cembra Pine, a fine conifer (*Pinus cembra*) of central Europe and Siberia, having edible seeds and yielding a turpentine called Carpathian balsam. "Swiss stone pine" and "Siberian pine" are variant names. The fruit is known as "cembra nuts."

Cement. A cement is any compound which, under certain conditions, is plastic and under others develops tenacity and can be used for holding together various materials; hence glue, lime, asphaltum, mucilage, and solder are cements. By far the most important class of cements structurally and commercially are the hydraulic cements, mixtures of lime, silica, and alumina that have the property when mixed with water to a paste of cohering or setting and finally becoming stone hard, even under water. The hydraulic cements may be divided into four classes based on differences in the materials used. The setting is probably due to the same general chemical reactions in all hydraulic cements, the lime uniting with the alumina and silica to form hydrous calcium silicates and aluminates. The quickness with which these reactions take place vary, the composition of the original materials and the differences in the methods of manufacture being the controlling factors. Quick-setting cements may become hard in a few hours, while some slow-setting cements require many months to reach their maximum tenacity.

The four classes of hydraulic building material above mentioned are: (1) *Hydraulic lime* made from a limestone containing a small proportion of clay (8 to 10 per cent) by burning at a low temperature and slaking the burned rock with water. (2) *Hydraulic* or *natural-rock* cement made from a limestone containing a relatively high proportion of clay, by burning at a low heat and grinding the product to powder. (3) *Portland cement* made from an artificial mixture of carbonate of lime (either chalk, ground limestone, or marl), with a certain proportion of clay, burning at a white heat and grinding the clinker to powder. (4) *Pozzuolana* or *slag cement* made by mixing finely-ground scoria (volcanic ash) or some kinds of blast-furnace slag with a small proportion of slaked lime. Of these the second and particularly the third are of chief importance in this country though the manufacture of slag cement is a promising industry.

The manufacture of hydraulic lime though carried on to a considerable extent in France, has never been established in this country probably owing to the abundance of excellent cement-rock in New York, Pennsylvania, and other

states. Hydraulic lime is light and bulky compared with the other cements. It requires from one to several days to set and hardens slowly, but some grades resist the continued action of sea water even better than Portland cement.

Natural-rock cement.— This material also known as common cement, hydraulic cement, Rosendale cement, and quick-setting cement, is manufactured in great quantities in some parts of the United States. It is made on a considerable scale in France, but the German and English output has been insignificant for some years. In the United States the material used is limestone or marl often containing over 23 per cent. of clay and the limestone is generally dolomitic, that is, contains carbonate of magnesium. In Europe magnesian limestones are seldom used. The cement rock is quarried, broken, and burnt in continuous kilns, much as limestone in the manufacture of ordinary lime. The burnt rock is a mass of partly vitrified clinker not affected by water. It is ground in mills of several types. Formerly all plants used millstones, and the light yellowish or brownish powder fine enough to pass a 50-mesh screen, is sent to market in barrels containing about 300 pounds, or in sacks. When mixed with water this cement sets in a few minutes and hardens gradually. It is cheap and when mixed with one part of sand by weight is used for mortar or concrete and for cistern and reservoir linings. It has not the great tensile strength of Portland cement, hardens slower and more imperfectly.

The composition of Rosendale cement rock and natural hydraulic cement is as follows:

Carbonate of lime	45.91
Carbonate of magnesia	26.14
Silica and insoluble	15.37
Sesquioxide of iron, Alumina	11.38
Water and undetermined	1.20
	100.00

Silica	22.75
Alumina and iron sesquioxide	16.70
Lime	37.60
Magnesia	16.65
Alkalies	.....
Carbonic acid	5.00
Sulphate of lime, Water	1.30
Total	100.00

The chief center of the industry in this country is the Rosendale district of Ulster County, New York, where the rock quarried is a limestone of the lower Helderberg series. It is also made in Pennsylvania, the Louisville region of Kentucky and Indiana, at several points in Illinois and around Milwaukee, Wis. The outputs in 1902 were: New York, 2,234,137 barrels; Indiana and Kentucky, 2,150,000; Pennsylvania, 942,384; Wisconsin, 481,020 barrels.

Portland cement.— This material was first made in England in 1824. The name is taken from the resemblance of the mortar to the oolitic limestone of Portland island in the English channel. The industry was later taken up in Germany. In both countries the industry grew enormously and the output now amounts to over 20,000 barrels yearly in Germany, and to nearly 9,000,000 barrels in England. Portland cement was first made in the United States at Coplay, Pa., in 1878, and since then works have been established in at least fourteen other states. The growth of the industry is perhaps the most marvellous thing in the whole history of the industrial development of this country. No farther back than 1894 the total annual product was small. Since then the output has increased enormously, over 100 per cent in a single year, and the annual product exceeds England's.

The composition of some Portland cement materials and Portland cements is shown by the following tables:

	Coplay, Pa., natural rock and limestone		Montezuma, N. Y., clay and marl		Santa Cruz, Cal., clay and coral rock		Phillipsburg, N.Y., natural rock only
	Cement rock	Limestone	Clay	Marl	Clay	Coralline	Cement rock
Lime	37.60	50.15	6.62	47.68	2.83	51.31	42.00
Silica	18.34	4.46	50.08	6.22	63.73	2.40	16.00
Alumina	4.08	1.00	14.50	1.70	22.12	1.56	6.00
Iron sesquioxide	3.41	.48	4.61	.86	9.01	.51	2.00
Magnesia	1.39	.87	4.40	.04	.....	1.25	.38
Alkalies	.19	trace	5.10	2.20	.21	1.45	.....
Carbonic acid	31.05	40.40	.....	42.11	.....	40.32	33.42
Sulphuric acid	.....	.....	.....	.....	.....	.....	.....
Sulphur	.73	.15	.....	.....	.....	.....	.....
Water	.....	.....	.....	.....	1.12	1.21	.....
Organic and undetermined	3.21	2.49	14.69	.....	.98	.99	.20
Totals	100.00	100.00	100.00	100.81	100.00	100.00	100.00

	Coplay, Pa.	Santa Cruz, Cal.	Phillipsburg, N.Y.	High grade English	Alsen & Son, Germany
Silica	20.64	23.48	22.00	25.00	24.90
Alumina	6.93	8.47	9.00	12.00	11.22
Iron sesquioxide	5.41	5.18	4.00	60.00	
Lime	62.79	61.91	62.00	1.00	59.98
Magnesia	1.72	.....	1.00	.....	.38
Sulphuric acid	.11	.....	.....	.....	.86
Alkalies	.27	.92	.....	1.00	.50
Water	.....	.....	.....	.....	.....
Carbonic acid	.99	.....	.50	.....	.....
Loss and undetermined	1.14	.04	1.50	1.00	2.16
Totals	100.00	100.00	100.00	100.00	100.00

In 1891 but 13.2 per cent of the product used in this country was of domestic manufacture, in 1900, notwithstanding the great increase in consumption, due to the growth of the building industry from 1895 to 1900, the domestic manufacturer furnished 80 per cent of the material used. To-day the best grades of American Portland cement are as good as those produced anywhere, and in effectiveness of equipment, large output, and cheapness of production, the leading Portland cement plants of this country are models for the world. Not even in the development of our iron and steel industry have American energy, resourcefulness and mechanical, been more strikingly displayed. In making Portland cement, two processes are used, the wet and the dry. In the wet process marls and clays are used; in the dry process natural cement rock. The wet process plants are mostly in the marl section of Ohio, Indiana, and Michigan; the dry plants in the limestone

and shale regions of Indiana, Missouri, Virginia, eastern Pennsylvania, and western New Jersey. It is in the Lehigh section of Pennsylvania that the best features of American practice have developed. The stone is quarried by the use of air-drills and high explosives, at a cost of 18 to 50 cents per ton; the shale and limestone broken in large gyratory crushers, thoroughly dried in mechanical drier, finely ground in ball or tube mills or in mills of the centrifugal type and burnt to a clinker in cylindrical rotary kilns. The clinker is cooled in cooling towers and ground or stored for a few days and then ground to a fine powder in ball, tube, or centrifugal mills. For burning the clinker coal dust is generally used as fuel. The finely-ground clinker is packed in barrels holding 400 pounds each, or in sacks, for market. In the wet process the methods used differ only up to the burning of the clinker, and the differences are due to the nature of the materials, the clay and marl being ground together wet. But 15 per cent of the United States product is made in the wet way. The chief producing states in 1902 were: Pennsylvania, 8,000,000 barrels; Michigan, 2,400,000 barrels; New Jersey, 1,900,000 barrels; New York, 990,000 barrels; Illinois, 900,000 barrels.

The following table shows the production of natural hydraulic and Portland cement; the imports, exports, and domestic consumption, the figures being taken from 'The Mineral Industry:'

Year	Production				Imports	Exports	Consumption	
	Natural hydraulic	Portland and slag cement	Total barrels	Value	Value	Value		
1885..	4,000,000	150,000	4,150,000	$3,492,500	$840,191	$113,555	.....	.....
1890..	7,664,500	335,500	8,000,000	6,000,000	3,175,159	152,295	.....	.....
1895..	.....	750,000	.....	.....	.....	.....	.....	.....
1900..	9,177,222	11,309,052	20,486,274	15,393,109	3,330,445	289,186	23,481,933	18,434,368
1902..	9,083,759	17,082,175	26,165,934	22,023,248	2,581,883	575,268	28,402,466	24,429,863

Slag cement.— The ancient Romans used volcanic scoria or "pozzuolana" mixed with slaked lime to make a cement, the durability of which is attested by the solid masonry of many ruins. Within recent years it has been found that certain kinds of furnace slag, especially those from the manufacture of steel by the basic process, can give hydraulic properties to common lime. The mixture forms a slow-setting and slow-hardening cement that in time develops great strength. Though condemned by manufacturers of Portland cement, the product is gaining ground and the tonnage annually produced in Germany is considerable. In this the industry did not exist until 1895. Now there are large works making slag cement at Chicago, Ill., near Birmingham, Ala., at Jersey City, N. J., and elsewhere. A plant at Sharon, Pa., uses slag having the following composition: Silica, 32.72 per cent; alumina, 12.95 per cent; iron, 2.52 per cent; lime, 47.67 per cent; magnesia, 2.71 per cent; sulphur, 1.44 per cent. This slag as it comes from the furnace is granulated by contact with water and then dried. The lime is burnt, slaked, and mixed with the slag by mechanical mixers. The mixture is finely ground in tube mills. The resulting cement has this composition: Silica, 27.33 per cent; alumina, 11.61 per cent; iron, 2.43 per cent; lime, 55.83 per cent; magnesia, 1.93 per cent; sulphur, .87 per cent. The total production of slag cement in the United States in 1902 was 109,435 short tons, valued at $465,100. There are at least seven plants making it, two being in Alabama.

The use of cement, particularly in concrete construction, is increasing rapidly and bids fair to grow with the decrease of our forests.

Bibliography.— Baker, 'A Treatise on Masonry Construction' (1889); Calcare, 'Cement User's and Buyer's Guide' (1891); Caudlot, 'Ciments et chaux hydromliques' (Paris, 1897); Clarke, 'Architects' Handbook on Cement' (1892); Heath, 'Manual on Lime and Cement' (1890); Spaulding, 'Notes on the History and Use of Hydraulic Cement' (1893). See CONCRETES; GLUE; LIMESTONE; MORTAR. For statistics and methods of manufacture, consult 'The Mineral Industry,' also Lewis, 'American Cements' (1898).

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Cementation Process, in steel making. See IRON AND STEEL; STEEL; STEEL MANUFACTURE.

Cemetery, a place of sepulture. See BURYING PLACES.

Cenchrus. See SAND-BURR.

Cenci, Beatrice, bā-ä-trē'chē chĕn'chē, Italian lady, the cause of the extermination of the noble family of Cenci. Muratori, in his 'Annals' (Vol. X., part 1, 136), relates the story as follows: Francesco Cenci, a noble and wealthy Roman, after his second marriage, behaved toward the children of his first marriage in the most shocking manner, procured the assassination of two of his sons, on their return from Spain, by banditti, seduced and debauched his youngest daughter Beatrice, a maiden of singular beauty. She discovered this shocking crime to her relatives, and even sought to obtain protection from Pope Clement VIII. It appears, however, that this was not granted: for, when the guilty father continued his former treatment with aggravated wickedness, she joined with her brother Giacomo, and hired two assassins, who put the monster to death as he slept. The guilty parties were discovered, confessed the murder on the rack, and were condemned by the Pope

to be torn to pieces by horses. In vain did the learned Farinaceus exert himself to obtain a mitigation of their punishment by a lively representation of the depravity of the deceased, 9 Sept. 1598. According to other accounts, Beatrice and her relatives appear to have had little or no share in the murder of the old Cenci; but a tissue of villany and baseness gained belief to the false testimony of two banditti against the Cenci family. So much is certain, that, 11 Sept. 1599, Beatrice Cenci and her stepmother were executed with a sort of guillotine called mannaia. Giacomo was killed with a club; the younger brother was pardoned on account of his youth; but the estates of the family, to which belonged the Villa Borghese, were confiscated, and in 1605 presented by the reigning Pope, Paul V., of the house of Borghese, to his family. In the Barberini Palace at Rome, travelers are shown an excellent painting, said to be by Guido Reni, as the portrait of the unfortunate parricide; but this is now controverted, and recent investigations tend to show that the popular version of the whole story is far from the true one. Shelley has made the Cenci the subject of a drama. See Bertolotti, 'Francesco Cenci e la sua Famiglia' (1877).

Ceneda, chā-nā'dä. See VITTORIO.

Cenis, sĕ-nē', **Mont,** a mountain belonging to the Graian Alps, between Savoy and Piedmont, 11,755 feet high. It is famous for the winding road constructed by Napoleon I., which leads over it from France to Italy, and for an immense railway tunnel, which required nearly 14 years' labor. It superseded a grip railway which was constructed over the mountain by Mr. Fell, an English engineer in 1864–8. The tunnel does not actually pass through the mountain, but through the Col de Fréjus, about 15 miles to the southwest. The Mount Cenis Pass is 6,765 feet above the level of the sea, whereas the elevation of the entrance to the tunnel on the side of Savoy is only 3,801 feet, and that on the side of Piedmont 4,246 feet. The total length of the tunnel is 42,145 feet, or nearly 8 miles. For the sake of the drainage the bottom of the tunnel has a culminating point about the middle, and falls southward 128 feet, and northward 473 feet. The breadth of the tunnel at the base is about 25 feet, at the widest part about 26 feet; its height at the Modane end is 24 feet 7 inches; at the other end about a foot higher. The determination of the exact direction and height of the tunnel occupied a full year, and the work of piercing the tunnel was carried out with so much precision that the borers who had begun simultaneously from both ends met exactly. The tunnel is laid out for two lines of railway. The roof and walls are lined with masonry to the thickness of two feet seven inches, and where the ground is not very firm it is underarched. The boring was at first carried on by hand labor, and one eighth of the total length of the tunnel was finished in this way, but the rest was constructed by machines specially devised for the purpose. Each boring machine had 18 borers, by which holes about three feet in depth were wrought in the rock. For the blasting of every yard of the tunnel 97 borings on an average had to be made, and above 100 pounds of gunpowder were employed. The total cost of the tunnel amounted to $12,636,000, which was borne partly by the French and Italian governments and partly by the Northern Railway Company of Italy. The first mine of the tunnel on the Italian side was exploded by Victor Emmanuel at the end of August 1857; on Christmas Day, 1870, the workmen met in the middle of the tunnel; and on 17 Sept. 1871, the tunnel was officially opened.

Cen'obites (Gr. *κοινος*, common, *βιος* life), monks living in community with others, under a common rule instead of seeking the strict solitude of anchorites. The ascetics of the first ages, who dwelt in the deserts together, were usually called by this name, the place in which they lived being called a *cœnobium*. Some writers refer the institution of these communities to the times of the apostles, others to St. Anthony (q.v.).

Ce"nogen'esis. While many animals during postembryonic growth pass through a series of stages which are similar to the ancestral forms of such types (palingenesis), in certain species development is direct. The different stages of growth or metamorphosis are crowded back to the embryo stage, or abbreviated, and the animals hatch or are born in the shape of their parents. This is called cenogenesis. Thus certain frogs, as a tree-toad of Guadeloupe, W. I., where there are no marshes, do not pass through a tadpole stage, but hatch without tails, and with legs, and otherwise resemble their parents. The same is the case with certain shrimps and crabs, and is partly the case with the lobster. In all such instances the direct development is apparently due to a difference in the environment, or other conditions of life, especially in certain crustacea, to a change from salt to fresh water.

Cenotaph, sĕn'ō-tăf, a monument erected in honor of a deceased person, but not containing his body, as is implied from the derivation (Gr. *κενός* empty, and *τάφος* a tomb). They were often erected by the ancients, who believed that when the body was not buried the soul could not be admitted into the abodes of the blessed.

Cenozoic (sē-nō-zō'ik) **Era,** the last of the five great divisions commonly used in classifying geological time, and therefore including the present. As it is the last, its records are much more complete than those of the Mesozoic, but while more complete they are, perhaps, more perplexing. Of the older eras — as, for instance, the Palæozoic — much of the record left in the rocks has been obliterated, and thus only the traces of the greater changes in the distribution of land or water and of variations of climate have come down to us. Thus, while much is lost, the broader grouping of facts is easier. In the Cenozoic we have such a wealth of detail, such a great mass of evidence to sift and correlate, that geologists differ greatly as to how the record of the rocks shall be translated.

Generally speaking, the rocks of the Cenozoic Era are less compacted than those of the Mesozoic, being very often beds of loose sand or clay. They usually lie horizontal, though sometimes upturned in a great mountain range. Any particular series is seldom of wide extent, and different series tell widely different stories of climatic conditions. Thus, probably no series in the Cenozoic in North America is comparable with the coal-bearing formations of the Cretaceous.

As to the climate of the Cenozoic, it was at first remarkably mild and even, Spitzbergen and Greenland having as mild a climate as that of Ohio to-day. Gradually the climate became colder, resulting in the great continental glacier of the Ice Age. At a comparatively very recent date these glaciers receded, and the climate of the earth became substantially what it is to-day.

Cenozoic life is, on the whole, well differentiated from Mesozoic, particularly by the great development of mammals and, probably well along in its last half (reckoning by actual time), by the advent of man. As mammals have developed, so reptiles have declined, and to-day only snakes, crocodiles, lizards, and turtles represent the class; the great ichthyosaurs, plesiorsaurs, dinosaurs, and pterosaurs were passing away by the end of the Cretaceous. In fact, as the Mesozoic was the era of reptiles, so is the Cenozoic the era of mammals. Among invertebrates many curious Mesozoic types have disappeared, but of the genera in existence early in the Cenozoic most still exist. This also is true of Cenozoic plant life.

As has been noted, geologists differ in their divisions and subdivisions of Cenozoic time. American geologists generally make two great divisions, Tertiary and Quaternary.

Consult: Dana, 'Manual of Geology'; Geikie, 'Text-book of Geology'; Le Conte, 'Elements of Geology.' See also GEOLOGY; GLACIAL PERIOD; QUATERNARY; TERTIARY.

Cen'ser, a vessel in which incense is burned. Censers were employed by the Jewish priests for presenting incense to the Lord in the sanctuary. Josephus tells us that King Solomon made 20,000 gold censers for the temple of Jerusalem to offer perfumes in, and 50,000 others to carry fire in. Censers or thuribles are used in some modern churches, especially in the Roman Catholic Church at mass, vespers, and on other occasions. They are suspended by chains, by which they are swung about in the hand to spread the incense in all directions.

Cen'sors ("assessors"). In ancient Rome, originally two officers who rated the property of citizens in order to assess their taxes, on which all political rights were based; the community being graded by amount of income from estates. Being thus arbiters of the political and social position of every freeman, they speedily became the most important officials in the state except the occasional dictators. The supreme judicial functions, and the control of morals, fashion, and speech, which we associate with "censorship," flowed naturally from this. The essence of their duty being to fix the status of each citizen, they took cognizance of everything which bore upon it; and became arbiters of the sumptuary laws and customary observances which are the cement of early communities. Not only could they expel a senator from the senate and take his horse from a knight or even reduce him to the ranks for lack of property qualification, or notorious evil living, but they could punish for slack tillage, celibacy, demeaning occupations, extravagance, or any other conduct thought prejudicial to the common weal. There was an appeal to the popular assembly, however, and they had to state their charges publicly. The censors also filled vacancies in the senate, and appointed its chief, originally at will, later according to a prescribed list. They let out the taxes to farm, took charge of public buildings, roads, aqueducts, etc. The term, legendarily five years at the outset, was a year and a half in historical times; originally patricians alone were eligible, but by fully historical times the plebeians had gained one censorship and occasionally secured both. The emperors assumed censorial power under the title "prefects of morals." The last who bore it was the brother of Constantine the Great.

In American history, the title was given to two sets of state officers in imitation of the Roman office. The 1776 Constitution of Pennsylvania provided that the people should elect a council of censors once in seven years, two for each city and county, to investigate the acts of the governmental departments, inquire whether or not the Constitution had been violated, etc. This curious article was dropped in the revised Constitution of 1790. But in Vermont a similar article had a far longer life, surviving until a comparatively recent time. That State in 1777 proclaimed its independence, and drew up a Constitution. One article, following the example of Pennsylvania, provided that on the last Wednesday of March in 1785, and the same day every seventh year thereafter, the people should choose a council of 13 censors, who should examine whether the Constitution had been preserved inviolate; whether the legislature had performed its duty as a guardian of the people, or had exceeded its powers; whether the taxes had been justly laid and collected, and how the public moneys had been expended; and whether the laws had been duly executed. They were also empowered, if they thought a change in the Constitution was needed, to call a convention to meet within two years thereafter, giving notice of the proposed change at least six months before the meeting. The last one so called, in 1870, abolished its creator; but the censorship seems to have worked fairly well for nearly a century.

Censorship of the Press, a regulation subjecting books, pamphlets, and newspapers to the examination of certain civil or ecclesiastical officers, who are empowered to authorize or forbid their publication. Such a regulation was suggested by Plato, and an informal censorship existed in the times of Greece and Rome. After the Roman Catholic Church acquired a share in the civil power it induced the state to condemn heretical books. Throughout the Middle Ages it sanctioned the principle that books objected to by its authorities should be suppressed. The invention of printing and the increasing number of books called forth new and stricter prescriptions of censorship, and there still remain copies of books printed in 1479 and 1480 which are accompanied with solemn approbations and attestations in their favor. Finally, in 1515, the Council of the Lateran, assembled at Rome, decreed that in future no books should be printed in any town or diocese unless they were previously inspected and carefully examined by the bishop of the diocese or his deputy, or by the inquisitor of the diocese or his deputy, or if at Rome by the Pope's vicar and the master of the sacred palace. Every work which was approved was to be countersigned by the hand of the censor, and any publication not thus coun-

tersigned was to be burned and its author or editor excommunicated. See INDEX.

In countries where the Reformation prevailed, the censorship was not abolished. Licensers of books were appointed in England, who were for the most part bishops. A general system of censorship was established by a decree of the Star Chamber, dated 11 July 1637, which was later confirmed by an act of Parliament. It was against this act that Milton wrote his great plea for freedom of the press, the 'Areopagitica,' but the censorship was not abolished until 1693.

Censorship of the press existed under the old French monarchy. It was abolished at the Revolution, but revived under Napoleon I. and again under Napoleon III. Except in Russia and Germany, where it is still in force, systematic censorship of the press may be said scarcely longer to be maintained in European Christian countries. In the United States there has never been such a censorship, although there are laws against publications of a scandalous character; there are various State laws against libel and a government censorship in the Philippines.

Censure, in canon law, a spiritual penalty whereby a contumacious offender is denied the use of certain spiritual goods. It has three degrees, excommunication, suspension, and interdict. By excommunication the offender is cut off from association with the faithful whether in spiritual things or in secular; by suspension a minister of the Church, a cleric, is deprived of the right to exercise the functions of his station; by interdict the services and ministrations of the Church are denied to an offender — the sacraments and the right to Christian burial. An interdict may affect places as well as persons; it may be laid on a church edifice or a burial place. Censures are the penalties prescribed in the Church's law for definite offenses, and some censures fall upon the offender, *ipso facto* or *ex ipso jure,* without need of a judgment being pronounced by Church authorities. Such a censure is said to be *latæ sententiæ,* that is, providing for its own carrying out; but most censures are *ferendæ sententiæ,* requiring that the sentence be pronounced by some proper authority, as the bishop of a diocese or his deputy. And absolution from some censures *latæ sententiæ* is reserved to the supreme pontiff, while absolution of other censures can be given by bishops, or other pastors, either in the ordinary course of their jurisdiction or in virtue of special faculties accorded to them to that end. An example of a censure, release from which is reserved strictly to the supreme pontiff himself, is the censure of excommunication incurred by whoever violently assaults a cleric or a member of a religious order (*clericus vel monachus*); but an exception is made of the case where the offender is in danger of death.

Cen'sure, Congressional, of the President of the United States, a makeshift in lieu of an unattainable impeachment. There have been two cases of this, one by the Senate and one by the House. (1) During the long debate in the winter of 1833–4 over Jackson's cessation of deposits in the United States Bank, resolutions of censure were moved in the Senate; and after three months' wrangling over them and their form, it resolved 28 March 1834, 26 to 20, that the President had arrogated authority "not conferred by the Constitution and laws, but in derogation of both." Jackson, by a special message 15 April, protested that this was a virtual impeachment of him as violating his oath of office, without giving him a chance to defend himself. The Senate majority (John Tyler being one) refused to receive or record the protest. Thomas H. Benton thereupon gave notice that he should move yearly to have the resolution expunged. It was objected that this contravened the Constitutional requirement to keep a journal, but Benton argued that the resolution was no part of legitimate legislative proceedings. On 16 Jan. 1837, the Jacksonians carried the curious compromise of having the resolution surrounded with black lines on the journal, and marked "Expunged by order of the Senate"; which of course left it intact, and merely recorded a change of feeling as to its justice. (2) To catch the Southern vote, the Democrat Tyler had been put on the ticket of the Whig Harrison in 1840; and on Harrison's death within a month of inauguration succeeded him as President. The Congress was Whig; and at its first session 1841–2, passed a tariff bill to distribute the surplus revenue among the States. Tyler vetoed it on the ground that the country had no business to raise taxes in excess of its needs, and that it was simply legalizing unjust burdens on the people. The Whigs had not a two-thirds majority to pass the bill over his veto, could not carry an impeachment, and in the House referred the veto message to a committee, which in its majority report censured Tyler for improper use of the veto. Tyler protested, and in reply the House sent him a copy of the Senate resolution he had voted for in Jackson's case.

Census. The utility to a government of knowing the extent of its resources in men and property is so obvious that some means of ascertaining it were probably employed early in history; but there is no record of it on the Egyptian or Assyrian inscriptions, and the Chinese accounts are dubious. The first we have reliable mention of is that of the Jews by David, including the males of 20 and over and the cattle; and the hatred and suspicion aroused by it are witnessed by the belief that God punished the whole people for the impiety. This apparently irrational feeling was universal in early times, has always been so in the East, and is by no means unknown elsewhere and later; its prevalence in 18th-century America, and even later in England, however, is probably due to misunderstood Bible teaching. The real reason was, that the early censuses had for an object not statistics, but taxation and conscription; and it was not to the advantage either of officials or people that the government should have too minute a knowledge of what could be extorted from them. Poverty and sparseness of population were too convenient excuses for not paying taxes or not remitting them to the capital. In the West, however, when constitutional government replaced autocracy, the census became a necessity for apportioning political rights and contributions; as in the Solonian constitution of Attica, where society was divided into four classes, with privileges graded according to income from landed estates. In Rome, whence the name "census" ("assessment") comes, it

was much the same; and as the enumerations were valued merely for the ratings deduced from them, not from any idea that statistics by themselves were of any value, they were discarded as soon as their use had passed, to the irremediable impoverishment of history. These censuses were taken at long and irregular periods, sometimes nearly half a century elapsing. But as the empire grew and the provinces were farmed by proconsuls, these found the same need of a thorough detail of their temporary estates, to know whether their sub-farmers were cheating them, that a capitalist does of his business; and each took a census (*professio*) of his own province on his own account, whose inquiries were sometimes almost as minute and exhaustive as those of the latest United States special census report on agriculture.

The mediæval censuses were of the roughest and far apart, and made only by a few enlightened rulers. Charlemagne attempted one for his dominion; and the Domesday Book of William the Conqueror in 1181 is familiar. This was a register of estates, with the heads responsible for feudal duties, their slaves and cattle — a census of the primitive type for the primitive objects.

The modern census, as a statistical review for its own sake, has a treble origin, in Sweden, England, and the United States. In 1686 the Swedish parish clergy were required to keep a record of births, marriages, and deaths, accessions and removals of inhabitants, unusual happenings, etc. Of course registration, which is a record of changes, is not a census, which is a statement of condition at a certain time; but with a given basis it can be turned into one. By request of the Swedish Academy of Sciences, in 1746, the clergy were directed to compile statistics of population, etc., for a quarter-century past; but these were kept rigidly confidential till 1762. At their publication Dr. Richard Price, the founder of scientific life-insurance calculation, based his first insurance tables on them. At first annual, then triennial, since 1775 they have been published once in five years. Meantime, in England, the London bills of mortality, first begun after the plague of 1592, had been recorded weekly since 1603, the year of James I.'s accession; and in the last half of the 17th century Sir Wm. Petty, the noted political economist, used them as a basis for very valuable and stimulating works on the extent and growth of population, human fecundity, effects of social and political causes, etc. Others took up the subject and made computations. In 1791 Sir John Sinclair undertook the most herculean statistical task ever attempted, perhaps, by a single man — to compile a census of the population, agriculture, trade, and industry of the entire kingdom, by inquiries sent to the clergy of the Established Church. He sent out schedules of 160 interrogatories, received over 900 replies, and in 1798 published 21 volumes of results. His work, and his exhortations made weighty by his work, induced Parliament in 1800 to establish a census office; the first census was taken the next spring, and decennial censuses have been maintained ever since. That of 1851, like the American of 1850, was a long step in advance. The Russian censuses had begun earlier, but on the most ancient model, purely for military purposes, and therefore with no count of females. There were a few partial censuses from 1700 on. In 1718 Peter the Great ordered all landed proprietors to give in an account of their slaves; and the same year organized a body of canvassers to visit all the provinces and make returns to him of peasants, mechanics, domestics, and people without occupation. In 1722 a ukase ordered a census taken every 20 years thereafter, and it was observed till 1782, another taking place in 1796. In 1802 a central bureau was organized, and a census taken; and they have been taken in 1812, 1815, and 1834, decennially 1850–80, then in 1886 and 1897. France began taking them after the Revolution, Prussia in 1805; Austria, which had made rough counts for military conscription, organized a bureau in 1828; Belgium established one immediately after winning her independence in 1833, and it has been perfected by the genius of Quetelet and other eminent statisticians, and furnished most valuable contributions to science. Our own census was entirely independent of all these in origin.

The United States Census.— For the various guesses at colonial population, and the methods of arriving at them, see UNITED STATES (*Population*). It may be mentioned here, as germane to this subject, that when Gov. Hunter of New York in 1712 attempted to take a census, the biblical prejudice before mentioned compelled him to leave it unfinished; and that when the New Jersey government a few years later wished to do so, it did not dare begin. An accurate determination, however, became vital early in the independent life of the country. To apportion equally the burdens of the Revolutionary war, the Congress of the Confederation agreed to defray the charges out of a common treasury, to be supplied by the States in proportion to the value of all the land in each; and to requisition the quotas of land forces according to the quotas of white inhabitants. Under the Constitution of 1787 the question of number became exigent, as direct taxes and representatives in Congress were apportioned according to the number of free inhabitants in each State (including bound servants and excluding Indians not taxed) and three fifths of all others. Censuses, therefore, became part of the ordinary running machinery of the government; and the first one was taken in 1790. Nine months were allowed for the work, but the time was extended the next year, as regularly for many a decade thereafter. The scope of inquiries simply included families: the name of the head alone being set down, with the number of others included, and slaves as a property item, the sex and color of free persons, the number of free white males of 16 and upward, number of free white females, and of all other free persons. The enumeration was committed to the marshals of the judicial districts of the United States (16 in all), who were to employ assistants as needed. No form of schedule was provided, each enumerator using any sheets or blank book he chose. This continued till 1830. There was no central bureau to receive or supervise returns, which were put together by the marshals and transmitted to the President. A penalty of $200 was imposed for false returns or delay beyond a certain time; and the same on individuals for giving false information or refusing any. The returns in the North were given by counties, cities, and towns; in the South by counties only. Two copies of the enumeration of each

district were to be posted in some public place therein. The cost of this census was $44,377.28. The result, as usual, pricked many local bubbles; and as the country was not used to this, there was not only general disappointment but distrust of the census, and United States officials carefully explained to foreigners that the returns were very defective. This is not now believed.

The second census, that of 1800, was specifically intrusted to the Department of State. There was no change in methods, except that the secretary was to instruct the marshals as to schedules and interrogatories. The only changes in scope were to classify the ages of free white males rather more minutely, extend the classification to females, and insert the name of county, city, or town where the family resided. Memorials by Thomas Jefferson and Timothy Dwight, under the names of learned societies, wisely suggesting that Congress utilize the occasion by having the census include statistics of mortality, nativity, and industries, were ignored; but took root in later censuses. There were 19 districts, and the cost was $66,109.04.

The third census, that of 1810, improved somewhat on the loose methods of the two former. The enumerators now had to be residents of their districts, which could not be more than one county or city, but might be several contiguous towns, and must be plainly marked off by natural or political boundaries; and they must make personal inquiries at each dwelling-house or of the head of each family in their district. In Territories the secretary, or if there was none, the governor, replaced the marshal. Attested copies of the returns must be filed with the secretary of state. An attempt at a manufacturing census was made, and the secretary of the treasury was empowered to give instructions for it. But the time was too short; the inquiries were too many and injudiciously framed; the manufactories in a district were generally so few that the returns would disclose their private business, and there was no penalty for refusal to answer; and the returns were scattering and valueless for volume, though they had some value as indicating variety and distribution of industries. There were 26 districts and Territories, and the cost was $178,444.

The fourth census, that of 1820, for the first time introduced the valuable feature (suggested by Jefferson and Dwight) of distinguishing between natives and foreigners, naturalized or otherwise. It also discriminated the free colored and the slaves by sex and age, and the free whites between 16 and 18. It reduced the manufacturing interrogatories to 14, of much the same scope as now. and a digest was ordered made and printed. This department was a failure as before, however. There were 31 districts, and the total cost was $208,525.99.

The time of taking the fifth census, that of 1830, was changed on John Quincy Adams' suggestion to 1 June, as it has ever since remained. A very significant provision in the act was to prevent the marshals from blackmailing their subordinates, by exacting either bribes in advance or part of their pay later. Printed schedules were sent out, of uniform size, 18 x 15. The industrial statistics were dropped altogether. But inclusion was made of the deaf and dumb — white, free colored, and slave — classified by age but not by sex, and of the blind, not classified at all. Ages were also very minutely classified. There were 36 districts and Territories, and the cost was $378,545.13.

The sixth census, that of 1840, was in one respect the beginning of a new era; in most others, the close of an old one. It first attempted health statistics — those of the insane and idiotic, at public and private charge; educational — scholars in colleges, academies, and public schools, illiterates over 20, etc.; besides Revolutionary pensioners, an item wholly aside. Industrial statistics were also restored, and much matter collected. In a word, it was the first systematic and connected attempt to make the census a general body of usable statistics in the larger sense, a comparative survey of the life and changes of the country. But the effort is all that can be praised; its execution was a national scandal. The errors were so teeming and so monstrous that various bodies sent protests to Congress against its publication, and urged that it be either corrected, or if that were not possible, entirely disowned. This result was due partly to inadequate pay and ignorant enumerators, but partly also to the dislike in many sections to the new questions as "inquisitorial" and offensive. The old dislike to governmental "prying" was strong enough to warrant a prominent paper in becoming its spokesman, insinuating that the census was a "precursor to direct taxes," and that it was unworthy of "the dignity and the high functions of the Federal government to pursue such petty investigations." There were 39 districts, and the cost of the census was $833,370.95. It was published in three volumes.

All these six censuses had a common defect which robbed them of ultimate statistical value: they lacked uniformity in method, and to a large extent could not furnish comparisons or accurate deductions. The enumeration extended over long periods, many months at a time; the results were not summarized by counties, nor uniformly by cities or towns; the classification of ages of colored people was on a different basis from that of whites, etc.

The seventh census, that of 1850, begins a new era. The blunders of the last one, and the public disgust and indignation, had aroused great discussion as to proper methods; and on 3 March 1849, the same act which created the Department of the Interior also created a census board, consisting of the secretary of state, the attorney-general, and the postmaster-general, to prepare a census schedule including not above 100 inquiries. They framed plans which were adopted by Congress 23 May 1850. These schedules comprised: (1) Free inhabitants. (2) Slaves. (3) Mortality. (4) Products of agriculture. (5) Manufactures. (6) Social statistics. But the great advance which it made was in scheduling individuals instead of families, thereby making full statistical comparison for the first time possible. The name, age, sex, color, and place of birth of each person, free or slave, were now set down. Improvements in method were also made. The enumerators' districts were to be not exceeding 20,000, if feasible, on the basis of the last census; the returns were not to be compiled by the marshals, but at a central office in Washington created within the Department of the Interior. Its head or "supervising clerk," commonly called "superintendent

of the census," was Joseph C. G. Kennedy of Pennsylvania; the latter part of the compilation was done under the charge of James D. B. De Bow of Louisiana. There were 45 districts, and the work cost $1,423,350.75.

The eighth census, that of 1860, was on much the same lines as the previous one. Mr. Kennedy was superintendent. Fortunately, the enumeration was finished before the War broke out. The principal change in schedules was to classify females as well as males by occupation. In the compilation, slaveholders and slaves were classified by States and Territories for 1850 and 1860. There were 64 marshals and secretaries. Cost, $1,969,376.99.

The ninth census, that of 1870, was taken under changed conditions, some of which interfered with its completeness and accuracy. The mass of enfranchised negroes in the South could no longer be counted on plantations by one authority, and were too ignorant to answer questions for themselves; and the Reconstruction conditions greatly impeded work. A new system had been carefully drawn up by Garfield, after consultation with Francis A. Walker, Edward Jarvis, and other eminent statisticians, which would have made partial amends; but it was killed in the Senate. It formed, however, the basis of the next census. Gen. Walker, then chief of the bureau of statistics in the Treasury Department, was made superintendent, and his ability did much to redeem the defective system. The heading "slaves" had of course to be dropped, and the number of male citizens of the United States to be substituted. To satisfy the 15th Amendment, a schedule was introduced of the number of such citizens whose right to vote was denied or abridged except for crime, etc.; but it was valueless. The month of births and marriages within the year was added. In "colored," Chinese and Indians were discriminated from negroes. In "illiterates," those unable to read were distinguished from those unable to write. In nativities, the place of parents' birth was added, for the first time giving the number of native citizens of foreign parentage. A statement of public debts, State, municipal, etc., was included. Many changes were also made for clearness, or to remove objectionable inquiries. The enumerators were put under civil-service reform rules.

A strong effort was made to have an interdecennial census taken in 1875, but it was not successful, though Grant recommended it in two annual messages. But for that of 1880, the system desired for 1870 was passed, under Garfield's presidency, completely revolutionizing the census methods. The changes may be summarized as follows: (1) The superintendent of the census and his chief enumerators, instead of being mere clerks of the secretary of the interior, became officials directly appointed by the President and confirmed by the Senate. (2) The marshals — court officers appointed for duties unconnected with census work and often conflicting with it — were replaced by supervisors of the census, not to exceed 150 in all, and each State or Territory to have at least one. The entire number were appointed, and New York State had 11. Their assistant enumerators were subject to veto by the census office. (3) The enumerators' districts were reduced to an estimated maximum of 4,000 instead of 20,000, these subdivisions being also subject to the disallowance of the census office. This increased the number of enumerators from about 6,400 in 1870 to 31,265 in 1880; and enabled not only a swifter completion of work, but much closer local and personal knowledge on the part of enumerators, as each must be a resident of his district. (4) The time of enumeration was reduced to one month, or two weeks in cities of over 10,000 inhabitants by the previous census; making results more nearly simultaneous. (5) Compensation was more closely adjusted to work. (6) Industrial statistics for 279 cities and large towns, and for the country at large in certain selected industries, were withdrawn from the regular enumerators and given to certain special agents, who need not be residents. The enormous advantage of this scarcely needs exposition. Not only did it allow the employment of abler experts, but manufacturers will often give information to distant strangers, to be filed far off, which they would not put in the hands of local residents. In this census also a large use was made of "prior schedules," left with parties before the enumerator called; they had been introduced in 1870, but little employed. This census was by far the best, speediest, and most helpful of all to that date, and marked another era. The scope was also extended. For the first time the statistics of defectives, crime, and pauperism were thoroughly and properly classified; those of the factory system, of churches, museums, taxation, insurance, etc., entirely new, with better ones of schools and colleges, collected independently, were of great utility; and many improvements were made in other schedules. Gen. Walker was the head of this census also, and the author of most of its advances. Its cost was $5,790,678.40.

The 11th census, that of 1890, was in general taken by the same methods as the 10th. Ten chiefs of division were appointed, 175 supervisors, and 47,975 enumerators. The superintendent was Robert P. Porter. The most important additions were: (1) All surviving soldiers, sailors, and mariners of the Civil War, and their widows. (2) Classification of colored persons according to amount of white blood, from full-blooded negroes up to octoroons. (3) Indebtedness of private corporations and individuals. (4) All Indians in tribes, with Indian and English names of each, age, occupation, and whether paying taxes or not. (5) Census of Alaska. (6) Unincorporated express companies. An attempt was made to collect statistics of chronic disease; but the inquiries were too delicate to intrust to local residents or expect people to communicate to such, and the statistics gathered were of no value, besides exciting much public ill-will. Special agents were employed for 1,042 manufacturing centres, in place of the 279 in 1880. Special attention was paid to nativity, to fecundity of native and foreign-born mothers, the expectation of life of children of native and foreign-born parents, naturalization, and ability to read and speak English. Prior schedules were extensively used. Electric tabulation was employed, not alone greatly increasing both speed and accuracy, but enabling various statistical compilations to be made which were otherwise impracticable. It filled 25 volumes, and cost $11,547,127.13.

For the 12th census, that of 1900, preparations had been mooted before the 10th was well under way; and the question of a permanent census bureau, strongly urged over half a century since by the able statistician De Bow, was brought up, and its merits set forth in a valuable and exhaustive report by Supt. Porter. After much debate, an act of 3 March 1899 established such an office in the Department of the Interior. By this act the superintendent of the census is entitled the director of the census. The President, who appoints him, must also appoint an assistant director, who must be an expert statistician; and the director is to appoint five known and tried statisticians as chiefs of divisions, a geographer, a chief clerk, and a disbursing clerk. The first director under this bill was William R. Merriam; assistant director, Frederick H. Wines; chiefs of divisions, William C. Hunt, population; Willam A. King, vital statistics; S. N. D. North, manufactures; Le Grand Powers, agriculture; Walter F. Wilcox, methods and results; geographer, Henry Gannett. The law creating this bureau, however, greatly limited its scope. The collection of "side" statistics was thought to retard the preparation and publication of those assumed to be alone of general interest, and the inquiries were restricted to the four heads of population, mortality, agriculture, and manufactures. The work was to be finished within two years; and at this writing (May 1903) three of the heads have been published, two volumes for population, two for agriculture, and four for manufactures. This limitation would not be regrettable — the census organization not being the ideal one for many classes of statistical inquiries — but that Congress is not likely to appoint other boards or commissions to do the work thus dropped, as is done in foreign countries. There the census relates only to population, and other inquiries are made through other sources, or by copying registration returns. Congress, however, is doubtful of its power to compel answers except through the census acts.

State Censuses.— A number of States have Constitutional requirements that a State census shall be taken once in 5 or in 10 years, or between two national censuses; but only a few pay any attention to the matter or attain results of any value. Massachusetts, Rhode Island, New York, and Michigan thus far are the only States which have done good work in this line. The Massachusetts censuses from 1855 on, and the Michigan of 1874 and 1884, are notably good. On 3 March 1879, an act of Congress provided that any State which will take an interdecennial census in all respects equal to that of the United States, and file a copy with the secretary of the interior, shall receive from the national government 50 per cent of the amount paid to supervisors and enumerators, plus 50 per cent of the gain per cent in population between the two last preceding national censuses. Even this lure, however, has not thus far increased the interest of the States in their statistics.

WILLIAM R. MERRIAM,
Supt. Twelfth Census.

Cent, a United States coin and money of account, the 1-100 of a dollar. The convenience of decimal computation has caused in various countries the division of the monetary unit into hundredths, with names derived from Latin *centum* or its adjectives; as the French franc into centimes, the Dutch guilder into cents, the Italian lira into centesimos, the Spanish-American dollar into centavos, etc. Jefferson regularly used "cent" to mean the hundredth of any unit of mensuration; but in its first suggestion for our coinage it meant 100. The inconvenience of the English system being felt, Congress in 1781 instructed Robert Morris to devise a system of national coinage; and he proposed a unit of ¼ grain silver (or 1-1440 of a Spanish dollar, familiar in the colonies), of which 100 were to make a cent (about 7c. of ours), 500 a quint (34.7c.), and 10,000 a mark ($6.94). Jefferson proposed instead the dollar as the unit, the smallest coin to be of copper and 1-200 of it (that is, the old English farthing, our half cent); this was adopted 6 July 1785. But on 8 Aug. 1786, an act was passed, still modeled by Jefferson, to coin a cent, of which 100 were to weigh 2¼ pounds avoirdupois (157.5 grains each), and be equal to a dollar, and a half-cent proportionate. This was the first use of the name in our coinage, and doubtless represents Jefferson's "hundredth." The "cents" prior to this have not that name on them, and are really English half-pence. The difficulty of displacing a popular name is shown by that of "penny," which still clings tenaciously though absurdly to our cent, only half its value. Congress in 1787 established a mint in New Haven, and for years coined there the "Fugio" or "Franklin" cents, familiar to collectors. But from 1785 to 1788 several States coined copper "cents" on their own account. Vermont (not yet admitted) began in June 1785; Connecticut in October 1785; Massachusetts late in 1786 (real cents and half-cents); New York, 1786; New Jersey, 1786 (coppers 15 to the shilling). Under the Constitution the first coinage act was passed 2 April 1792, and raised the weight of the cent to 264 grains; but on 14 Jan. 1793, it was reduced to 208, and on 26 Jan. 1796, to 168, the half-cent always being proportional. The first coinage under the new act was in 1793. This old-fashioned "copper" remained unchanged except in pattern till 1857, and its forms from 1793 to 1857 are of seven types: (1) (1793), chain or link around the word "cent"; (2) 1793, wreath in place of chain; (3) 1793–6, liberty cap on pike over left shoulder of "Liberty"; (4) 1796–1807, "Liberty" with draped bust; (5) 1808–14, filleted head with 13 stars; (6) 1816–39, plain coronet with coiled hair; (7) 1839–57, same with braided hair. No cents were coined in 1815 or 1835. Those of 1799, 1793, and 1804, are very rare, as are also the *copper cent* of 1856, and the half-cents of 1793, 1831, 1840 to 1848, and 1852. On 3 March 1851, a 3-cent piece was authorized, of 12⅜ grains, 75 per cent silver, 25 copper, legal tender to 30 cents; on 3 March 1853, it was raised to .900 fine, but reduced to 11.52 grains, 3/50 of the half-dollar. On 21 Feb. 1857, the half-cent was abolished, and the old cent replaced by a smaller new one, of 72 grains, .88 copper and .12 nickel. On 22 April 1864, this was supplanted by a bronze cent, 48 grains (the present one), .95 copper and .05 tin and zinc, legal tender to 10 cents; and a bronze 2-cent piece, twice its weight and legal tender. On 3 March 1865, a 3-cent piece was authorized, ¾ copper and ¼ nickel, 30 grains, legal tender

to 60 cents; but the ones and twos were made legal tender to only four cents. On 16 May 1866, a 5-cent piece (the "nickel") was authorized, same material as the 3, 77.16 grains, legal tender to $1. On 12 Feb. 1873, all cents and their multiples were discarded except the 1, 3, and 5, as above, each to be legal tender to 25 cents; and on 26 Sept. 1890, the 3-cent piece was discarded. See NUMISMATICS.

Cent, a name given under the old Germanic constitution to a small portion of territory. Each province or district was subdivided into so many cents, and was placed under the special jurisdiction of an overseer or centenarius. The name corresponds with hundred as in English territorial division.

Cent-Gardes, säṅ-gärd, **Les** (Fr., "The Hundred Guardsmen"), a body-guard acting in the service of the French king during several centuries. See GUARDS.

Cent Jours, säṅ zhoor, **Les** (Fr., "The Hundred Days"), the second period of the reign of Napoleon I., so called because it lasted precisely 100 days, from 20 March 1815, when he re-entered Paris on his return from Elba, to 28 June of the same year, when the second restoration was established.

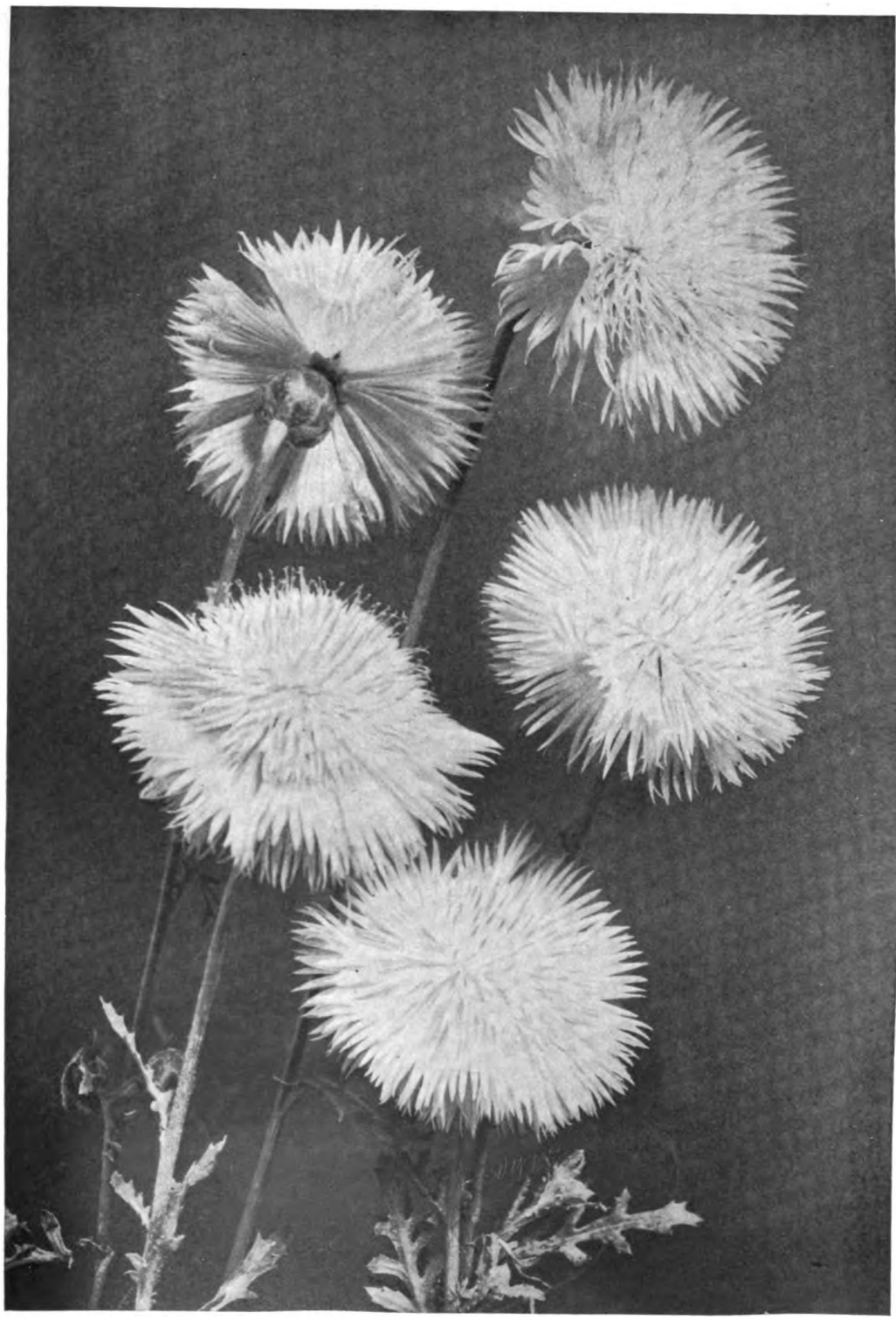
Cent Nouvelles Nouvelles, säṅ noo-vĕl noo-vĕl, a collection of facetious tales, first published at Paris in 1486. They were told at the table of the dauphin, afterward Louis XI., in the castle of Genappe during his exile. Their arrangement in their present form has been attributed to the Count of Croï, to Louis himself, and to Antoine de La Salle. The latter, however, seems to have been the editor. The work is a curious example of a kind of literature distinctively French, and which, since its revival by Voltaire in the last century, has always been successfully cultivated: the literature that considers elegant mockery and perfection of form adequate compensation for lack of morality and lofty ideals. The historical importance of the collection arises from its giving details regarding the manners and customs of the 15th century that can be found nowhere else. Its very licentiousness is commentary enough on the private life of the men and women of the time. In spite of its title, however, there is nothing novel in the incidents upon which the 'Nouvelles' are based. Their novelty consists in their high-bred brightness and vivacity, their delicately shaded and refined but cruel sarcasm. With a slight modernization of the language they might have been told at one of the regent's suppers, and they are far superior to those related in the Heptameron of the Queen of Navarre. The 'Nouvelles' also show us that the Middle Ages are past. Instead of gallant knights performing impossible feats to win a smile from romantic châtelaines, we have a crowd of princes and peasants, nobles and tradesmen; all, with their wives and mistresses, jostling and duping one another on a footing of perfect equality. Another sign that a new era has come is the mixed social condition of the 32 story-tellers; for among them, obscure and untitled men, probably domestics of the Duke of Burgundy, figure side by side with some of the greatest names in French history.

Centaurea, sĕn-tô'rē-a (commonly called BACHELOR'S-BUTTON, CORN-FLOWER, DUSTY-MILLER, or KNAPWEED), a genus of annual or perennial herbs of the natural order *Compositæ*. There are about 400 much confused species, mostly natives of western Asia and the Mediterranean region. A few are found in the western hemisphere, but only one, *C. americana,* in the United States. This species, popularly called basket-flower, is a very attractive hardy annual with rose-colored flowers. Many of the species are widely used in ornamental gardening. The following are among the most popular garden sorts: *C. cyranus,* the blue-bottle or corn-flower, common in European grain fields and frequently found wild in America. Its blue flowers yield a blue dye. *C. cineraria,* the dusty-miller, has white hairy leaves, and when grown as an edging plant — its most popular use — it is not allowed to flower. *C. moschata,* sweet-sultan, is widely grown for its large, fragrant flower-heads. *C. montana,* mountain bluet, which originally had blue flowers, has developed various other tints under cultivation. All the species are easily grown from seed and thrive in any good garden soil.

Centaurs, sĕn'tôrz, in Greek mythology, a fabulous race of people in Thessaly, on Mount Pelion. According to fable they sprang from the union of Ixion and a cloud. They are said to have been half horse and half man, and the fable is explained in this manner: The Centaurs first practised the art of mounting and managing horses. In the time of the Thessalian king Ixion a herd of wild bulls on Mount Pelion committed great devastations in the adjacent country. Ixion offered a reward to whoever should destroy them, in consequence of which the Centaurs trained horses for riding and slew the bulls. Mythology relates the combats of the Centaurs with Hercules, Theseus, and Pirithous. The latter, at the head of the Lapithæ, another Thessalian nation, their hereditary enemies, entirely defeated the Centaurs, killed many, and drove them from Pelion. The Centaurs, Nessus, Chiron, and others are famous in ancient fable. See CHIRON; DEJANIRA; HERCULES.

Centaurus, sĕn'tô-rŭs, or **The Centaur,** a southern constellation, only a small part of which rises in our latitude. Two stars of the first magnitude are catalogued in the portion which does not appear above our horizon. This is one of the 48 ancient constellations formed by Ptolemy, who first discovered the likeness of a centaur in it. On the celestial maps of the Arabs it is represented by a bear mounted on horseback.

Centaury, a genus of plants (*Erythræa*) of the natural order *Gentianaceæ,* of about 30 widely distributed species, mostly natives from western Asia to western Europe, of which two are of distinct ornamental merit. One of these (*E. venusta*) is from California; the other (*E. massoni*) from the Azores. They are hardy little annuals with rose-colored flowers, and are frequently planted in rockeries, in the soil of which the seeds may be sown in early spring. Some of the related species have been used to a small extent in domestic medicine, but rarely in regular medical practice. American centaury (*Sabbatia angularis*), of the same natural order,



Photograph by J. Horace McFarland Co.

CENTAUREA

is widely distributed in rich soil and sunny situations from western Canada to the Gulf States. It is often cultivated for its cymes of fragrant showy white or rose-colored flowers. Like the above, it has been used to a small extent in domestic medicine for simple ailments.

Centavo, thĕn-tä'vō, a Chilean coin equivalent to the cent (q.v.).

Cen'tenary, the commemoration of any event, as the birth of a great man, or the founding of a city or institution, which occurred 100 years before.

Centennial Exhibition, a World's Fair held in Philadelphia, Pa., from 10 May 1876, to 10 November of the same year. To celebrate the 100th anniversary of American independence, an association of Philadelphians in 1870 proposed an international exhibition of arts, manufactures, and agricultural products, to be held in the city where independence was declared. Congress passed an act 3 March 1871, authorizing the exhibition and also appointed a commission of one member and an alternate from each State and Territory, nominated by the governors, to report on dates of opening and closing, plans for buildings, method of receiving and classifying articles, custom-house regulations. The commission was organized 4 March 1872, with Joseph R. Hawley of Connecticut as president; and on 12 May chose as director-general of the exhibition Alfred T. Goshorn. On 1 June Congress appointed a centennial board of finance, to raise funds for the exhibition. This board was to solicit subscription to $10,000,000 of stock, and the corporators and subscribers were to elect 25 directors, who should apply the funds on the plans of the commission. Of 227,940 of individual subscriptions, Pennsylvania gave $1,749,468. The city of Philadelphia added $1,500,000; the State of Pennsylvania $1,000,000 more. Then Congress appropriated $1,500,000, besides $500,000 for a government building. Fairmount Park was selected as the site, 236 acres being used for the purposes of the exhibition. The buildings of the exhibition proper consisted of the main building (for manufactured products, mines and metallurgy, the public works of all nations, and a conspectus of science and education), built of iron and glass with masonry foundations, 70 feet high, 1,880 x 464 feet, with central transept of 416 feet and two end transepts of 216; Machinery Hall, 1,402 x 360, of wood and glass on masonry foundations, occupying with an annex nearly 13 acres; Agricultural Hall, 820 x 540, of wood and glass; Horticultural Hall, built by the city of Philadelphia, a permanent structure of iron and glass in Moorish 12th-century style; Memorial Hall, intended as a permanent art gallery, of granite, glass, and iron, in Renaissance style, 365 x 210 and 59 feet high, with a central tower 150 feet high, surmounted by a colossal statue; the United States Government Building, 504 x 306; the Women's Pavilion, an acre in extent, not only for the convenience of women, but for the collection and exhibition of their work; the Shoe and Leather Building, and the Carriage Building, besides annexes. Moreover, 26 States erected buildings of their own, costing over $400,000; and a number of foreign countries, out of 49 which took part in the proceedings by invitation, erected their own buildings. There were over 200 separate buildings in all. The admission fee was 50 cents; 7,250,620 paid it in full, 753,654 paid a special 25-cent rate, and 1,906,692 went in free, making 9,910,966 admissions in all.

By the system of awards adopted the exhibits — to the number of over 50,000 — were divided into 36 groups, and these subdivided again and again into small sections. Each of the last was assigned to a special jury of awards, who had to make a statement in writing of the special merits they found in the articles which they esteemed best, and the uses for which each was best fitted, and to sign their names to the award: this left no room for carelessness or irresponsibility, and gave the maker the benefit of names of known weight. These judges included many of the ablest and most famous men of science and the professions and other great experts in the Western World; and the awards have been a source of just pride.

The exhibition was a most important landmark in the industrial history of the country, and other countries. Not only did it make later ones possible and successful here, but it diffused inventions, broke down stolid self-conceit, and immeasurably advanced the knowledge of all the nations which took part in it. For instance, the Bell telephone was first exhibited there, and gained immediate celebrity from Sir William Thomson's enthusiastic praise; and the American bicycle manufacture sprang from Col. Pope's inspection of English cycles there. It showed European countries with new clearness the marvels of American machinery-making, especially the immense development of mechanism with interchangeable parts, from watches to steam boilers and artillery. It made the first collection ever attempted of women's work on a large scale. It first made the beauty and grace of Japanese decoration and patterns popularly known. It shed new light on art principles in general. It illuminated educational systems with light from foreign sources. No public or private money was ever better invested than that devoted to creating and profiting by this collection. The official account of the exhibition was published by the government in 1880.

Centen'nial State, a popular name given to the State of Colorado on account of its admission to the Union in 1876, the 100th year of American independence.

Centeno, Diego, dē-ā'gō thān-tā'nō, Spanish soldier: b. Cindad-Real, Spain, 1504; d. La Plata, upper Peru, 1549. Going to South America he accompanied Alvarado to Peru and soon became famous as a skilful fighter.

Center. See CENTRE.

Centerville, Iowa, city in Appanoose County; on the Rock Island, the C. B. & Q., the I. & St. L. and the Iowa Central R.R.'s, 70 miles south of Des Moines. The town was settled in 1832 and was incorporated as a city in 1846. It is the centre of a coal mining, agricultural and stock-raising region. It has four banks, 15 churches, and an excellent public school system. Pop. (1900) 5,256.

Cen'terville, Va., a village of Fairfax County, 27 miles west of Washington. It is memorable for the series of battles fought in its vicinity on the last days of August 1862, in which the Federal army, under Gen. Pope, suffered heavy loss and a severe repulse.

Centesimo, sĕn-tĕs'ĭ-mō, a coin of Italy, Peru, etc., equivalent to a centime (q.v.).

Centiare, sĕn'tĭ-ār, or sŏñ-tyär, a measure of surface of the metric system, the hundredth part of an are (q.v.) or one square metre, equivalent to 10.764 square feet.

Centigrade Scale. See THERMOMETER.

Cen'tigram, or **Cen'tigramme,** a weight of the metric system, the hundredth part of a gram (q.v.), equivalent to 0.15432 grain troy.

Centiliter, or **Centilitre,** sĕn'tĭ-lē-tėr, a measure of capacity of the metric system, the hundredth part of a litre (q.v.), equivalent to a little more than three fifths of a cubic inch.

Centime, säñ-tēm, a French coin, in value one hundredth of a franc or about one fifth of a United States cent.

Cen'timeter, or **Cen'timetre,** a measure of length of the metric system, the hundredth part of a metre (q.v.), equivalent to 0.3937 inch. Its abbreviation is *cm.*

Centimeter-Gramme-Second System. See UNITS.

Cen'tipede, or **Centiped,** one of those myriapods (*Chilopoda*) with long, many-jointed, flattened bodies, each segment bearing only a single pair of legs. The mouth-parts, besides a pair of jaws (mandibles), consist of two pairs of maxillæ, those of each pair being fused together in the middle. The first pair of legs are fused at their base, and form the poison-fangs, the poison-gland being situated in the base, and the poison oozing out of an orifice at the end of the leg. The single oviduct and corresponding male duct open at the end of the body in the penultimate segment. The centipedes (*Scolopendra*) are mostly confined to the tropics, a small species extending as far north as North Carolina. Those of the West Indies and the tropics in general are eight to nine inches in length, one species, however, attaining the length of 18 inches. Their bite is dangerous, quite as much so as the sting of the scorpion. They are ferocious when attacked or seized, biting energetically. In the northern States the centipedes are represented by the species of *Lithobius* (*L. americanus*), which are wrongly called "earwigs," and live under stones, under the bark of fallen trees, etc. They prey on insects and worms. They have been observed to attack earthworms, grappling with them for several hours and, after killing them, sucking their blood. Very long, slender forms are *Geophilus* and its allies. The body is composed of from 30 to nearly 200 segments, each bearing a pair of legs. They are eyeless, and live buried in the sand, coming to the surface under stones.

The centipedes are hatched with numerous segments, and corresponding legs. Wood states that the female of a centipede (*Scolopocryptops sexspinosa*) guards her young by lying on her side, and then coiling her body, passes them along by a quick action of her feet, thus arranging them satisfactorily to herself. He also describes the manner of molting in this species.

The chilopods are more nearly related to the insects than are the millipedes (q.v.). They are a less ancient group. No true *Chilopoda* are known to exist in rocks older than the middle Tertiary period, species of *Cermatia, Scolopendra, Lithobius,* and *Geophilus,* having been detected in amber and the gypsum beds of Aix, Provence, France, of Oligocene age. (See CHILOPODA.) Consult: Wood, 'The Myriapoda of North America' ('Transactions,' Amer. Phil. Soc., Philadelphia 1865); also the writings of Meinert.

Centlivre, säñt-lēvr, **Susanna Freeman,** English actress and dramatist: b. Ireland about 1667; d. London 1 Dec. 1723. When very young she married a nephew of Sir Stephen Fox. Becoming a widow within a year she took for a second husband an officer of the army of the name of Carrol, who was killed in a duel the second year of their wedlock. This event in her singular career reduced her to considerable distress, and led her to attempt dramatic composition. Her first production was a tragedy entitled the 'Perjured Husband,' performed in 1700. This was followed by several comedies, chiefly translations from the French, which exhibited the vivacity that distinguishes her literary character, and met with some temporary success. She also tried the stage as an actress on the provincial boards, and by that means attracted the attention of her third and last husband, Mr. Centlivre, Queen Ann's head cook, whom she married in 1706. She still continued writing for the stage, and produced several more comedies. Some of these remain stock pieces, of which number are 'The Busy Body'; 'The Wonder'; and 'A Bold Stroke for a Wife.' They are diverting from the variety of incident and the liveliness of the characters, but want the accompaniments of adequate language and forcible delineation. They partook of the license of the age. Mrs. Centlivre enjoyed the friendship of Steele, Farquhar, Rowe, and other wits of the day. Having, however, offended Pope, she obtained a place in the Dunciad, but is introduced by no means characteristically. An edition of her works with a biography appended appeared in 1872.

Cent'ner, a German weight, in common use on the continent of Europe, which is nearly the equivalent of the British hundredweight. It formerly varied in the different German states, but since the introduction of the metric system of weights and measures into the German empire, 1 Jan. 1872, the value of the centner has been fixed at 50 kilograms, or 100 German pounds, equivalent to 110.23 pounds avoirdupois. In Austria it is equal to 110½ pounds, and in Sweden to 112.06 pounds.

Cento, chĕn'tō, Italy, a city 13 miles north of Bologna, on the eastern bank of the canal of Cento, and near the river Reno. It is surrounded by a rampart and ditch, and contains several churches, convents, and a cathedral. The celebrated painter, G. F. Barbieri, commonly called Guercino, was born here about 1590. Pop. 5,000.

Cento, sĕn'tō (Latin, "patchwork"), originally a cloak made of patches; hence, as Lessing observes, the dress of Harlequin is called in Apuleius *mimi centuculus.* The term has been transferred to such poems as have been formed out of verses taken from other poems. It was a particular art to combine passages of different authors on different subjects in this manner so as to form a regular whole. Thus there were in early times Vergilian centos (*centones vergiliani*), in which most of the verses

were taken from Virgil; for instance, the 'Cento Nuptialis' of Ausonius, and centos from the verses of Homer (*Homero-centones*).

Cen'tral Africa Protectorate. See BRITISH CENTRAL AFRICA PROTECTORATE.

Central America is a continent of distinct geologic formation, with east and west mountain-folds, at right angles to those of North and South America. Though on the map it appears to be a mere isthmus extending in a southeasterly direction from Mexico to Colombia, between the Caribbean Sea and the Pacific Ocean, it is in fact structurally much more nearly related to the West Indies, including the Gulf of Mexico and the Caribbean Sea, and to the northern coast of South America, than to the main bodies of the larger continents. Probably in the Tertiary period Central America and the Antilles together formed a great island or archipelago lying between North and South America. (Compare Robert T. Hill's 'Cuba and Porto Rico,' etc.). This subject will be referred to below, in connection with "volcanoes and soil."

Politically, the name groups together Guatemala, Honduras, Salvador, Nicaragua, and Costa Rica: five republics which are characterized in the treaty of peace signed at Corinto, Nicaragua, 20 Jan. 1902, as "the Central American family." Moreover, the Isthmus of Panamá at the commencement of its history under the Spanish régime was associated not less intimately with the settlements in the region north and west of it than with those of South America; British Honduras (Belize) also, an English colony, lying between Guatemala and the Caribbean Sea, has been connected about equally with the history of the Central American states and with that of Yucatan (Mexico). We shall therefore mention both Panamá, a department of Colombia, and British Honduras in the following historical sketch.

History.—Rodrigo de Bastidas, a notary of Triana, was the first Spaniard to explore the Caribbean coast of Central America. He embarked at Cádiz in October 1500; and, after reaching the mainland of South America near the present Venezuelan boundary, coasted westward and made observations of the isthmus from a point below Darien to Nombre de Dios. Columbus, on his fourth voyage to America, sailing from Cádiz 9 May 1502, and stopping at Santo Domingo on the way, arrived off the shore of Honduras July 30. There he heard reports of the wealth of Mexico, but decided to continue the voyage southward, searching for a strait that should lead across terra firma to India. Thus they passed a cape to which they gave the name Gracias á Dios, and on 25 September reached the river San Juan de Nicaragua, and heard stories from the natives which made them believe they were within a nine-days' journey of a splendid land, such as Marco Polo had described in his veracious account of travels in Asia, and that the river Ganges lay only a little beyond. On 7 October they came to the beautiful Laguna de Chiriqui, and on the adjoining Veragua coast they obtained a large amount of gold by trading with the natives.

Columbus lingered in the immediate neighborhood of the Chagre (now called Chagres) River and Colon — at Porto Bello from 2 to 9 November, and at other points within a few miles for three weeks and five days. Thus during more than a month the great discoverer hovered voluntarily about the spot where the strait he dreamed of was to be cut after four centuries should have elapsed. And when he thought to return by the way he had come, abandoning the search, stress of weather held his vessels back, so that it was not until 6 Jan. 1503, that they anchored in a little river just west of Colon. He wished to plant a colony on the coast between Veragua and Cerebaro, but, hostilities breaking out between the Spaniards and the natives, the former were obliged to abandon their attempt, and once more Columbus passed the place of the future canal, clinging to the shore before setting a straight course for Jamaica.

First Spanish Colonies.— In 1506 Juan Diaz de Solis and Vicente Pinzon sailed along the coast of Honduras westward, exploring the Gulf of Honduras, in search of a passage by water to the Far East — India and Cathay. Several years passed before the Spanish king, Ferdinand, authorized Alonzo de Ojeda and Diego de Nicuesa to colonize and govern in his name the northern coast of South and Central America. The river Darien or Atrato was made the dividing line between their dominions. The eastern or South American portion was called Nueva Andalucia, and of this Ojeda was made governor; the western division was named "Golden Castile," *Castilla del Oro,* and the command given to Nicuesa. The latter secured the larger number of followers; the former, however, attracted to his standard Martin de Enciso, afterward governor, Balboa, discoverer of the Southern Sea, and Francisco Pizarro, conqueror of Peru. The forces of both governors suffered extreme hardships. Nicuesa's capital was at Nombre de Dios, Ojeda's at San Sebastian — so named because the Indians afflicted them as that saint was tortured. Ojeda returning to Española, where he died, Euciso, Balboa and Pizarro removed the capital of Nueva Andalucia to Antigua del Darien — that is, a point within Nicuesa's dominions; but the natives of Darien did not poison their arrows. In the contest for supremacy that ensued, Nicuesa was the loser. Balboa assumed command, and Antigua became the centre of Spanish enterprise in that part of America. On 25 Sept. 1513, Balboa discovered the Southern Sea, and four days later took possession of it, with all its lands and ports and islands in the name of the king and queen of Spain. Before news of this discovery reached the Spanish court, a successor to Balboa had been appointed in the person of Pedrarias (also called Dávila). In 1517 Balboa was falsely charged with treason, and executed. Pedrarias Dávila, being superseded in command, migrated to the south coast and founded the city of Panamá, 15 Aug. 1519.

A voyage into the unknown northwest from Panamá was made in 1522 by Gil Gonzales, who explored the Dulce and Nicoya gulfs indenting Costa Rica's southern shore. Thence northward 50 leagues he went, to the domain of a chief whose name was Nicaragua, and who dwelt near the principal lake of that region. Gonzales learned that this lake, though lying near the Southern Sea, had an outlet to the Caribbean. In his narrative he says that the discovery is important, inasmuch as only "two or three leagues of very level road separate the two

seas." The expedition returned to Panamá in 1523, after baptizing thousands of natives and securing 112,000 *pesos* of gold. On 15 Sept. 1521, Panamá was made a city with royal privileges; the episcopal see was transferred to it; from this base expeditions were sent out toward Peru as well as into the northwest. Pedrarias, in 1524, dispatched Francisco Hernandez de Cordova with Hernando de Soto and other captains to Lake Nicaragua. Gil Gonzales, continuing his discoveries in Honduras and Nicaragua, came into collision with de Soto; and only a little later one of the captains of Hernan Cortez, the Spanish conqueror of Mexico, appeared as a claimant for the territory of Honduras.

In the latter part of October 1524 Cortez set out from Mexico, marching to Honduras with an army of about 100 horsemen, 40 archers and arquebusiers, and 3,000 native warriors and servants. After making himself governor of the country, he returned in triumph to Mexico City in May 1526. Pedrarias went to Nicaragua about the same time: there were rival Spanish governors even then in Nicaragua and Honduras. Guatemala and Salvador were overrun by Pedro de Alvarado, second in command to Cortez: the former country, in which a great empire had existed at the beginning of the Christian era, was inspected by Alvarado in 1522, and conquered with a small force of Spaniards and native allies before two years had passed.

Veragua.— In 1535 an unsuccessful attempt to colonize Veragua was made in the interest of the descendants of Columbus (on whom the titles, "Duke of Veragua," etc., had been conferred), and a still more calamitous enterprise was that of Diego Gutierrez, a citizen of Madrid who led an expedition to Costa Rica north of Veragua in 1540. Francis Drake, English privateersman, attacked Nombre de Dios in 1572. Again, in 1595, Drake (now Sir Francis, knighted for his feat of sailing round the world), Sir John Hawkins and others took Nombre de Dios; but an English force of 750 men sent to attack Panamá was defeated by the Spaniards when half-way across the isthmus. Drake, dying on 28 Jan. 1596, was buried off Porto Bello. The conquest of Costa Rica was undertaken by Nicaraguan Spaniards in 1560. Partial success rewarded the efforts of the soldiers; meanwhile, however, great progress had been made in the pacification of that province by the efforts of Franciscan friars.

Buccaneers in the 17th Century.— Captain William Parker, sailing from Plymouth in November 1601, captured Porto Bello. In December 1616 the king of Spain informed the governor of Castilla del Oro that he and the commercial world believed that communication might be easily established between the oceans by constructing a canal. This was the century of English depredations and of Spanish idle dreaming — Spain's centuries of vigorous expansion having passed. In 1668 the Welsh buccaneer Morgan plundered Porto Bello, his foul cruelty rivaling any Spanish misdeed in this blood-stained region. Three years later, having at his disposal a fleet of 37 ships and a force of 2,000 fighting men, he captured Panamá (January 1671). The inhabitants set fire to their homes, and built a new city of the same name at a little distance in a locality less exposed to attack. Granada, in Nicaragua, was sacked by French and English pirates in 1686.

Scotch Colony on the Isthmus.— A number of influential Scotchmen, chief of whom was the founder of the Bank of England, William Paterson, were authorized by the Scottish parliament in 1695 to found colonies in savage lands; afterward obtaining letters patent from William III. of England. Paterson chose Darien, believing the control of the traffic of the isthmus to be essential to the prosperity of England; he certainly was not, as is incorrectly and commonly stated, merely anxious to make money for his company, and reckless of consequences to the colonists. See Bannister's 'Life'; Rodriguez's 'Anexion de Cuba'; etc. The largest and most costly expedition that had yet been fitted out for colonization in America sailed from Leith, 26 July 1698, and founded "New St. Andrew." Subsequently recruits were sent out to them; but the project came to a miserable end. More than 2,000 lives and several millions of money had been lost, when the survivors were starved into surrender by the Spaniards.

A British squadron commanded by Admiral Edward Vernon (21 Nov. 1739), took Porto Bello, but was defeated at Cartagena. Meanwhile English settlements of a very peculiar character had been begun in Mosquitia and at Belize.

Mosquito Coast.— The Misskito tribe, called by the Spanish and English "Sambos" or "Mosquitos," a hybrid people, descendants of fugitive slaves, "Cimarrones," and natives, ruled by an hereditary king, dwelt on the eastern coast of Honduras and Nicaragua in the 17th century. Unoccupied by the Spanish, this coast was frequented by buccaneers, who made Cape Gracias á Dios, on the dividing line between the colonies just mentioned, their rendezvous. Small settlements of English adventurers existed in this region; by the treaty of Madrid (1670) certain rights were conceded to Great Britain; the British claim was asserted (1744) by sending troops and building forts, but withdrawn (1786) when an agreement was reached as to the cession by Spain of the territory on the north coast of the Gulf of Honduras to which we shall now refer.

The English Colony.— The foundation of Belize, on the coast east of Guatemala and south of Yucatan, by the Scotch buccaneer Peter Wallace, has been described in the article "Belize." The ex-freebooters of Belize, reinforced by other white adventurers, Mosquito Indians, etc., were able to exploit the rich forests and hold their own, or more, in the contest for the possession of this territory waged at intervals between the authorities of Yucatan and the wood-cutters (regarded as interlopers) from 1733 until the end of the 18th century. The treaty of Versailles (1783) defined the limits of Belize; such limits were more precisely stated in the treaty signed at London, 14 July 1786; but the boundaries were subsequently extended by encroachments of the wood-cutters. Thus England, retaining the region now known as the colony of British Honduras, abandoned possession of the Mosquito coast, though her claim to exercise a certain degree of influence in the latter territory (from which the Spaniards were expelled by the Sambos in 1796) was not expressly and absolutely surrendered until 1850 or 1860. (See treaties mentioned below.) Before that deter-

mination, several reverses were sustained in Nicaragua. An English force was repulsed at Fort San Carlos in 1769. A few years later the design to sunder the Spanish provinces of Central America, and at the same time to capture a route for an interoceanic canal, by taking possession of Lake Nicaragua and the cities of Granada and Leon (see Bancroft's 'Central America'), proved infeasible. An English force of about 1,800 men, including a party of marines under Horatio Nelson, was forced by the deadly fevers to abandon the attempt.

Spain in Possession.— Except Belize, Mosquitia, and large tracts in which the Indians remained nearly undisturbed, Spain now held the land, but no longer had energy or opportunity to develop its natural resources. The natives, more docile and serviceable than in other parts of America, seldom increased the difficulties of the situation by uprisings; there was, however, little incentive to accumulate property in a land menaced constantly for a hundred years by English, Dutch, and French pirates, and the mother country had grown too poor to take the lead in industrial enterprises. The several divisions of an apathetic population were easily drawn together for administrative purposes: the captain-general of Guatemala by the middle of the 18th century controlled the provinces of Costa Rica, Honduras, Nicaragua, and Salvador, beside others now within Mexican boundaries. Revolt against Spain was the form in which the spirit of the people, awakened from this lethargy, naturally expressed itself. Unfortunately armed revolt has ever since been too closely identified with progress in the popular conception. The first weak blow for Central American freedom was struck in San Salvador, 5 Nov. 1811. A sequel to this attempt (in Leon, Nicaragua, 13 Dec. 1811) duplicated this Salvadoran effort, in result as in motive. A third failure was recorded when the Colombian insurgents (1820) fitted out a combined sea and land expedition to operate against the towns of Omoa and Trujillo. The Isthmus of Panama cast in its lot with South America, rather than with Central America, by voluntary annexation to the republic of Colombia on 28 Nov. 1821. (For its subsequent history see COLOMBIA and PANAMA.) The declaration of independence at the city of Gautemala, 15 Sept. 1821, was little more than an echo of the triumphant cry of other Spanish-American colonies in revolt; it was soon followed (5 Jan. 1822), by a decree of the *junta directiva* annexing Central America to Mexico. Salvador refusing to join in this surrender, a war with Guatemala ensued. Before 18 months had passed the Central American provinces resolved to form a union and constitute a single nation. On 1 July 1823 a national constituent assembly expressed this purpose, the name chosen for the nation being *Provincias Unidas del Centro de America.*

Slavery Abolished.— Though laggards in the race to win freedom, the Central Americans were prompt in bestowing it. The laws of 31 Dec. 1823, and 17 and 24 April 1824, emancipated their slaves and declared that slaves of other countries on coming to Central America should be freed. When dissensions and civil war broke up their confederacy, they had at least taken one step forward, in advance of their neighbors. The congressional decree of 30 May 1838, granting to the states the privilege of unrestrained action in most important matters practically dissolved the union, though Salvador tried to maintain or renew it long after the other confederates withdrew. Nicaragua, on recovering her autonomy, became involved in a dispute with Great Britain, the latter upholding the claim of the Mosquito king to all the territory lying between Cape Gracias á Dios and the mouth of the San Juan River, and sending (January 1848) two warships to occupy the port of San Juan. Nicaragua yielded provisionally to superior force. At this point the intervention of the United States was felt. The Clayton-Bulwer treaty, concluded at Washington 19 April 1850, between the United States and Great Britain, provided that neither power should occupy, fortify, colonize, or exercise dominion over any portion of Central American territory (except Belize), or make use of a protectorate in any form. In regard to this treaty the statements have been made: (1) That it guarantees Central American independence; (2) That it encourages the maintenance of English influence. Both statements are correct. The English influence was considered beneficial within certain limits (see BELIZE.) By the Zeledon Wyke treaty of 28 Jan. 1860, England ceded to Nicaragua absolutely the protectorate over the Mosquito coast.

Walker's Campaign.— While the diplomacy of the government of the United States was in the main considerate and helpful at this time, the conduct of some of her individual citizens left much to be desired. San Juan del Norte, or Greytown, was bombarded by the United States sloop-of-war Cyane, and burned to the ground by a landing party from that vessel, on 13 July 1854, the excuse offered for this violence being an alleged insult to the United States minister to Nicaragua. William Walker, a native of Nashville, Tenn., of Scotch descent, sailed from San Francisco, Cal., 4 May 1855, on the brig Vesta, with 58 men, to take part in the little wars of political factions in Nicaragua. Before long he found himself at the head of a considerable force composed of Americans, European adventurers, and natives, with whose aid he became master of the situation, forced the people to elect him to the presidency, and was inducted into office 12 July 1856. Attacked by the combined forces of Salvador, Costa Rica, Guatemala, and Honduras, he was obliged to capitulate. Returning in 1860 with another filibustering expedition (this time landing at Trujillo on the coast of Honduras), he was captured, tried by court-martial, sentenced to death, and executed.

Renewal of the efforts to achieve Central American unity was due in a measure to President Barrios of Guatemala (1873–85). For the further development of this design; the attempt (1895–8) to unite Honduras, Nicaragua, and Salvador; the treaty of 20 Jan. 1902, mentioned above, and events of the years 1885 to 1903, we refer our readers to separate articles on each of the five republics.

Mountain System.— The mountains described as extending directly at right angles to the cordilleras of North and South America are part of a great Antillean system. East and west mountain ranges of this type occur in the Isthmus of Panamá, Costa Rica, and the eastern parts of Nicaragua, Honduras, Guatemala, and the adjoining provinces of Mexico; also along the Colombian and Venezuelan coast of South

America, and in Cuba, Haiti, and the other islands of the Greater Antilles. Two submarine ridges stretching across the Caribbean Sea, between Honduras and the Sierra Maestra range in Cuba, and from Cape Gracias á Dios to Jamaica, are regarded as being genetically a part of the same system. The interesting suggestion is made by Mr. Robert T. Hill that the Caribbean lands before the close of the Tertiary period were much more extensive than now. «Geological surveys,» he says, «have proved that during this time of expanding Antillean lands, the Gulf Stream flowed out from the American Mediterranean as now, but through a passage across the northern half of Florida. . . . The great banks of the western Caribbean Sea were at that time projections of land probably connecting Central America with Jamaica and possibly Cuba.» Therefore Florida, the Bahamas, the Antilles, and at least the eastern part of Central America, totally severed from North and South America, together formed either one great island, or, more probably, a group of several large islands, with volcanic chains on the east and west (see CARIBBEAN SEA), and with characteristic rocks, calcareous and igneous, which have weathered into soils of unsurpassed fertility (see CUBA).

Volcanoes.— A Central American group of volcanoes, with 31 active craters crossing the western ends of the Antillean folds, occurs on the Pacific side of the republics, from Costa Rica to Guatemala. The central and eastern region is shown by the observations of Mr. P. W. Chamberlain, member of the American Society of Civil Engineers, to be well watered, with comparatively low mountains, very rich soil, and a good climate — except the Caribbean coast which, from Trujillo downward, including the Mosquito territory, is hot and insalubrious. Lack of communication and means of transportation has led to the abandonment of the intermediate lands, the most attractive and extensive part of the country, nearly or quite beyond the influence of the volcanic area. The easily approachable volcanic strip (in Nicaragua, for example, between the lakes and the Pacific) has been preferred hitherto as a place of residence. Thus one who visits only the principal cities in the centre of population, seeing nothing of the naturally richer and better districts, receives the impression that this is the most volcanic region of the globe. The largest volcanoes are in the north — for example, the Acatenango, 14,000 feet elevation, in Guatemala, and in the south — for example, the Irazú and Turealba, of 12,000 feet, in Costa Rica. In Nicaragua the highest, El Viejo, is only 5,800 feet above sea-level. In Guatemala we find the volcanoes, Fuego, Cerro Quemado, El Chato, etc.; in Salvador, Ilopango, San Salvador, and others. Earthquake shocks in the republics last mentioned, and also in Costa Rica, have been, as a rule, very severe, while those of Nicaragua are comparatively mild in force and extend over limited areas. The recorded seismic disturbances that have affected the whole country are those of 1538, 1648, 1651, 1844, and 1865. Central Nicaragua, east of the lakes, Nicaragua and Managua (the largest bodies of fresh water in Central America) is regarded as nearly immune from such disturbances. Nicaragua's centre of volcanic activity is a ridge, the Sierra de los Morabios, between the Cosigüina (whose outburst on 2 Jan. 1835 was considered the grandest on record before the eruption of Krakato in 1883), and the Momotombo. In this ridge are 10 vents, two of which, the Telica and Momotombo, are active, and none can be properly called extinct. Southeast from the Morabios ridge is the isolated active volcano Masaya. The Orosé is in Costa Rican territory. The island of Ometepe in Lake Nicaragua has two volcanoes, one dormant, the other extinct. Comparatively few members of the Central American chain of volcanoes are of the type with which fierce eruptions are commonly associated; moreover, the fertility of the soil on their flanks, due to the high percentage of soda and potash contained in volcanic dust, tempts agriculturists to remain in this neighborhood. It will be noted with interest, also, that the proposed line of the intercontinental railway keeps near to the Pacific coast. It is probable, therefore, that for many years yet to come the best part of Central America — the central districts — will receive only secondary consideration, remaining comparatively undeveloped.

Intercontinental Railway and Isthmian Canal.— Two subjects of great importance to this region are: (1) The plan to connect the railway systems of North and South America at the Isthmus of Panamá, so that the political and commercial capitals of all, or nearly all, American republics may be closely united by land routes. (2) The proposed shortening of the highways of the sea between the same nations by the construction of a ship canal (see ISTHMIAN CANALS). An all-rail route from New York to Buenos Ayres would be approximately 10,471 miles in length, of which about 5,000 miles remain (1903) to be constructed. The first International American Conference (1889–90) recommended the construction of the railroad necessary to join existing lines and give through rail communication; President Harrison approved the project (in a message, 19 May 1890); engineers were put in the field to make surveys, which were completed in 1895; in March 1903, a commissioner from the United States was sent to the Central and South American countries to ascertain the condition of lines in operation and the prospect for the completion of the undertaking. As shown by surveys published in 1902, the line will join an extension of the Mexican railway system on the northwestern frontier of Guatemala; it will have 230 miles in Guatemala, 220 in Salvador, 70 in Honduras, 224 in Nicaragua, and 363 in Costa Rica; in South America it will follow the curvature of the Pacific coast, though not closely, to Cuzco, Peru; and, in combination with the extensive systems of Argentina and Chile, will connect the Sierra of Bolivia with the southern capitals, Santiago and Buenos Ayres, with extensions to Rio de Janeiro and Asuncion. At present the principal railway lines in Costa Rica, Guatemala, and Honduras run from the interior to the ports. Guatemala leads, with 342 miles of railroad, Costa Rica has 222, Nicaragua 176 miles, Salvador 132 miles, and Honduras 50 miles. Such is the lack of transportation facilities between the countries of Spanish-America, a letter or express package from one of the Central American states, or even North America, intended for some of the South American republics, is sent first to Europe, to be forwarded to its destination; but the region now so isolated will lie at

GUATEMALA
BRITISH HONDURAS
HONDURAS
SALVADOR
NICARAGUA
COSTA RICA
PACIFIC OCEAN
CARIBBEAN SEA
GULF OF HONDURAS
Belize
Panama
Bay of Panama
PROPOSED PANAMA CANAL
PROPOSED NICARAGUA CANAL
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88° Longitude West from Greenwich

CENTRAL AMERICA
SCALE OF MILES.
0 10 25 50 75 100 125 150
Importance of places is indicated by different lettering, thus:
25,000 or over ..... GUATEMALA
10,000 to 25,000 ..... Santa Fe
1,000 to 10,000 ..... Limon
Smaller Places ..... San Rosa
Steamship Routes
Railroads
Submarine Telegraph Cables
CARIBBEAN SEA
MOSQUITO GULF
COSTA RICA
NICARAGUA
PANAMA
LAKE NICARAGUA
MOSQUITO RESERVATION
SAN JUAN DEL NORTE BAY
NICARAGUA CANAL (PROPOSED)
TO NEW ORLEANS
TO TAMPA
TO NEW YORK
TO SANTIAGO DE CUBA
TO PUERTO CABELLO
TO SABANILLA
TO PANAMA
Cisne I.
Caratasca Cay
Becerro Cay
Gorda Cay
Vivorilla Cays
Pichones Cay
Palo de Campeche Cay
Media Luna Cay
C. Gracias a Dios
Tamon Cay
Morrison Cays
Mosquitos Cays
Nasca Cays
North Cay
South West Cay
Roncador Cay
Old Providence I. (To Colombia)
Johnny Cay
St. Andrews I. (To Colombia)
Courtown Cays
Albuquerque Cay
Little Corn I.
Great Corn I.
Despenaderos de Bluefield
Clervo I.
Monkey Point
Punta Gorda
San Jacinto
Greytown (San Juan del Norte)
Boca del Colorado
Tortuguero
Parsimina
Limon
P. Limon
P. Cahuita
P. Carreta
R. Teliri O'Sicsola
P. Sarabeta
I. de Colon
I. Provision
C. Vallente
Escudo de Veragua
Chagres
Colon
Panama
Pt. Rincon
Pt. Gorda
Pt. Coaita
Belen
Mineral
Chorrera
Chame
Anton
Pueblo Nuevo
Santiago de Veragua
Pta. Burica
Punta Pena
Punta Burica
C. Matapalo
P. del Blanco
Golfo Dulce
Puerto Arenitas
P. Salsipuedes
P. Llorena
P. Violin
P. S. Jose
I. del Canos
P. Mala
P. Uvita
P. Dominical
P. Quipos
P. Barrita
P. Judas
P. Quiñones
C. Blanco
P. Gorda
P. Gulones
Pena Blanca
Nicoya
Puntarenas
Tilaran
Sierra de Tilaran
Cordillera de Dota
Cordillera de Chiriqui
Cordillera de Veragua
Istmus of Panama
BAY OF PANAMA
Bay Islands
Bonaca I.
Barbareta I.
Castillo Pt. or C. Honduras
Lemas
Piedracito
Iriona
Sangrelaya
Criba
Patuca
Deacons
Bonito
Esperanza
Negro R.
Cropunto
Ouhe
Crata
Orabela
Cowcara
Caratasca
C. Falso
Cape Gracias
Dulce Nombre
Tampa Cente
Wanks R.
Rio Coco
Gualatano
Bocay
Julana
Klilna
Pika
Karata
Huna
Tunka
Kukallaya
Walpasixa
Prinzapulka
Wanslua
Ruskikapin
Walpa
Kara
Tasbaponie
Pearl Cays
Caribtown
Seal Cay
Pearl Cay Pt.
Pearl Lake
Pearl City
Cama
Bluefields
Rama
Kurringwas
Kukerawalla
Muyuny
Huapi Mts.
Gamoapa
Comalapa
San Domingo or La Libertad
Juigalpa
S. Tomas
Granada
Zawatero Id.
S. Jose
Alta Gracia
Ometepe Id.
Solentiname Is.
Vol. Orosi
Vol. Tenorio
Vol. Barba
Vol. Irasu
Matina
Dos Novillos
Sarapiqui
Sarapiqui
Tortuguero
Parsimina
Mt. Miravalles
Castillo
Ochoa
Toro
Laguna
Heredia
Esparza
Alajuela
Cartago
Pacaca
Savanilla
Cabecar
Sibube
Boca del Toro
Laguna de Chiriqui
Pico Rocale
Pt. Rincon
Pt. Gorda
Pt. Coaita
Chiriqui
Angeles
S. Lorenzo
Tullica
Pta. Burica
Greenwich
86°
84°
82°
80°
17°
15°
13°
11°
9°
Bormay & Co., N.Y.

the crossroads of two great routes of traffic in the future.

Races.— Mr. H. H. Bancroft is authority for the statement that the most numerous class of the population in Central America, next to the pure Indians, are the *ladinos,* most of whom are half-breeds, including mestizos (the offspring of white and Indian), mulattoes, quadroons, octoroons, and zambos (or sambos — the offspring of Indian and negro). "The *ladino* class furnishes the domestic servants, muleteers, small farmers and tenants, herdsmen, and not a few beggars and robbers. . . . A considerable number of *ladinos,* however, become mechanics and traders, and many have attained high positions in the Church and the state, and become distinguished for their talents and abilities. The zambos and other mixtures of the negro race reside in the coast districts," doing the heaviest work. The Caribs, who have increased greatly in numbers since they were transported from St. Vincent by the British, are more active and industrious than the sambos. Salvadoran society, according to the same authority, has a small proportion of whites, while the mass of the population is Indian, *ladino,* and zambo; in Guatemala he found (1883) that the Indians numbered 750,000, *ladinos* or mestizos 430,000, white persons 10,000, negroes 8,000, and foreigners 2,000; in Honduras that "the amalgamation of races has almost obliterated the line distinguishing whites from blacks." In Costa Rica, on the other hand, the inhabitants are mainly white, and to a large extent descendants of Spaniards from Galicia, the Indians being distinct from the civilized race, and the negroes living almost exclusively on the coast.

Comparative Statement of Area, Population, Commerce, Imports, and Exports, etc.— The following comparative statement of the commerce, imports and exports, and interior developments of the five republics is based upon the latest complete statistics, equally representing all of the countries, that are now available — those for the year 1901:

1. Costa Rica: Area 22,000 square miles, population 310,000. Imports during 1901 were valued at $4,410,422.45, while the exports rose to $5,583,197.91, giving an excess of exports over imports of $1,172,775.46. Coffee exports reached a total value of $2,823,291.32, and bananas were shipped valued at $1,532,581.78 (nearly 4,000,000 bunches). Gold coin and bullion exported aggregated $682,409.23. Importations from the United States amounted to $1,946,726, while exports to that country for the same period aggregated $2,990,550. In the trade for 1900 and 1901 the United States shared to the extent of about 50 per cent in the import lists of the republic, as against 43 per cent in 1899, Germany's trade having fallen off one and a half points, while that of Great Britain advanced from 19.6 per cent to 22.6. Two issues of bonds were authorized during the year, the proceeds to be used in developing the railway interests of the country. On the other hand, Costa Rican bonds to the value of 642,300 *colones* (a *colon* equals $0.465 in United States gold or silver) were incinerated, having been issued in 1897 and 1899, and subsequently redeemed. A commercial treaty with France, providing for the reciprocal exchange of tropical products between Costa Rica, the French colonial possessions, and France, at the lowest rate of customs duties, was signed by representatives of the two countries interested on 7 June 1901, at San José. Trade conditions being reported as unfavorably affected by the decline in the price of coffee in foreign markets, a law abolishing the export duty on that article became operative on 1 Sept. 1901. According to a governmental decree, import duties on foreign goods brought into the republic were raised 50 per cent after 28 April 1901. A rapid development in the tobacco industry was noted. The net earnings of the Costa Rica Railway Company were sufficient to meet the interest on the capital invested, and to increase the reserve fund. In March the circulation of 30,000 *colones* was authorized by presidential decree. These gold coins were made at the United States mint in Philadelphia.

2. Guatemala: During 1901 Guatemala exported to the United States products valued at $3,512,445, as compared with $2,402,978 in 1900. The imports from the United States were worth $1,424,814, while in the previous year they were worth only $785,462. The tariff schedule of 1900 continued in force during the first six months of 1901. Certain exemptions were, however, made in favor of imports from the neighboring republics of Salvador, Honduras, Nicaragua, and Costa Rica. A reduction of 30 per cent, provisionally granted in the customs tariff to merchandise imported from Europe and the United States, was extended for another period of six months. On 12 Aug. 1901 a decree was issued by the government providing that the duty of six *pesos* (Guatemalan *peso* equals $0.361) per quintal on coffee exported from the republic should remain in force until 30 June 1902. The crop of 1901 was estimated at 480,000 quintals. A decree in January 1901 authorized the appointment of four teachers, two men and two women, who should be sent to the United States at the government's expense for the purpose of studying the methods of instruction in that country. With a view to the proper exploitation of the forest lands, special regulations were enacted. The president of the republic, in his annual message to the national Legislative Assembly at the opening of its regular session in 1901, noted the improvement in public highways, the development of agriculture, and in general the moral and material advancement of the country. In January definite steps were taken for the completion of the Northern Railway, which will be of great benefit in the development of Guatemala's latent resources, and to this end a contract was made with the Central American Company. The government of Guatemala proposed, as a guaranty for the cost of construction, an issue of 6 per cent gold-bearing bonds to the amount of $4,000,000, redeemable within 10 years, the road and rolling-stock to become eventually the property of the government. A contract was entered into (April 29) between the government and the Guatemala Central Railroad Company for the extension of the Patulul branch of that road, to connect the Guatemala Central and the Occidental Railroad, thus placing the capital in direct communication with the northern and western provinces. A tramway between Guatemala city and Guarda Viejo was authorized, the concession including the free importation of the necessary cars. To prevent mining monopolies, the national Legislative Assembly prohibited the holding of more than one mine by one individual in his own name, or of more

than three mines by any corporation of three or more members. The area of Guatemala is 47,810 square miles; its population in 1897 was 1,501,145.

3. Honduras (British): Area 8,000 square miles; has about 32,000 inhabitants. See BELIZE; HONDURAS (*British*).

Honduras (Republic of) has an area of 46,400 square miles. Population 543,741. In the fiscal year 1901 the exports of Honduran products to the United States were valued at $1,258,317, as compared with $988,606 in the preceding year, while the imports from the United States in the same years were valued at $1,115,009, and $1,181,453, respectively. Other countries furnishing imports were: Germany, to the value of $486,373, England $471,650, France $101,855, British Honduras $152,800, other Central American states, $107,402. Leading exports: Precious metals, $2,279,115.50; fruits, $1,945,388; cattle, $557,316; coffee, $275,193; cabinet woods, $274,255; tobacco, $213,423; hides and skins, $182,345; indigo, $107,365; sundries (hats, wheat, salt, etc.), $177,503. Seventy per cent of the exports were taken by the United States, Germany and the Central American republics dividing the balance. Exports exceeded imports by $2,014,000. Net government receipts from all sources, $3,017,273.40; expenditures, $2,840,397.21. Payments on the national debt during the year, $805,144.73, leaving the total indebtedness of the republic at the beginning of 1902, $1,285,207.75. The coinage of 1901 exceeded that of 1900 by $3,948.52. During the year 2,999 ships (total capacity, 491,199 tons) entered the ports. These vessels brought 5,168 passengers, and carried away on their outward voyages 3,928 passengers. Exports of ores from the mines amounted to $470,293.50 more than in 1900. The quantity of mail handled by the post-office service was greater than in the previous year. The telegraph system was extended by 120 miles of additional wires, making the total length of the telegraph lines 3,166 miles. During 1901 the number of messages sent was 543,599, or 31,045 more than in 1900. A report of the secretary of war presented to the national congress showed the total strength of the army to be 40,079 men. Subjects of national importance were: the canalization of the Patuca River, the systematic culture of rubber, and the construction of a line of railway from Omoa to the Bay of Trujillo — the concessionaires in the matter of the railway being citizens of the United States.

4. Nicaragua: Area, 40,000 square miles, population, 360,000. Exports to the United States in 1901 were of the value of $2,035,636, as compared with $1,520,266 in 1900. Imports from the United States were of the value of $1,482,194 and $1,817,869 in 1901 and 1900 respectively. Total foreign commerce of the republic in the year 1900: imports, $2,487,952; exports, $2,836,557. In 1901 Managua was made headquarters of the German consul-general, who exercises control over German consulates in Salvador, Honduras, and Costa Rica. At the close of 1900 the total debt of the republic was approximately $4.000,000, of which $2,666,000 represented internal indebtedness, and about $1.334,000 the foreign debt. During the year the government floated a loan of $451,000, the bonds being purchased by local merchants and business men. A treaty of reciprocity between Nicaragua and Chile provided for the free admission of certain articles at the ports of those countries. With a view to developing trade relations with Spain, a special exhibition of Spanish products was established at Managua in the National Museum. The work of connecting the eastern and western railway systems was continued; a syndicate of citizens of the United States undertook to build cart-roads to certain mines, and purchased the exclusive rights of navigating the largest river in Nicaragua, the Segovia; a concession for a railway from Matagalpa to the head of navigation was granted to a citzen of the United States; a concession was granted to a company for the establishment of a line of steamships, to run between the Caribbean ports, and carry the mails between Bluefields (formerly written Blewfields) and New Orleans; a dock to cost $150,000 and to be built at Corinto was contracted for, and the government also granted a concession for the establishment of a thread and cloth mill. Increased attention was given to the cultivation of the rubber-tree, the only important agricultural industry of the Caribbean coast country having been until recent years the growing of fruits, principally bananas. There was but one large manufactory of sugar.

5. Salvador: In order to improve the interstate relations of the republics of Central America, a session of delegates from the various countries was held in the city of Salvador in February 1901, at which it was agreed that the products of the states there represented should enjoy reciprocal free entry. The exports in 1901 included 326,588 sacks of coffee, worth $8,308,466 in silver. Other products exported were of the value of $2,647,579, silver. Imports during the same period were valued at $2,615,150.64, gold, which, with exchange at 150 per cent, equals $6,537,876.60 silver. Exports to the United States in 1901 were worth $1,037,715, as compared with $738,674 in 1900. Imports by Salvador from the United States in 1901 were valued at $738,722; in 1900 they were $679,440. At the beginning of the year 1901 the republic of Salvador was reported to be entirely free of foreign debt, bonds covering such indebtedness having been redeemed and destroyed in November 1900. Receipts from taxation in 1901 were: Customs duties, $4,168,564.59; tax on liquors, $1,814,761.99; sundry taxes, $315,283.14; telegraphs, post-offices, etc., $258,111.84; total, $6,556,721.56. To this sum there must be added $1,133,958.17 (from deposits, licenses, etc.), which, added to the balance on hand at the beginning of the year, makes the total receipts $7,825,764.40. Disbursements in 1901 were: Legislative, executive, and judicial branches of government, $4,378,948.31; payment of different credits, $3,197,956.09; return of deposits and other expenditures, $63,986.77; balance 31 Dec. 1901, $184,873.23; total $7,825,764.40. The public debt on 31 Dec. 1901 was $8,325,904.43. Salvador's area is 7,255 square miles; its population, according to the census of 1901, was 1,106,848.

Bibliography.— H. H. Bancroft, 'History of Central America 1501–1887'; C. H. Berendt, 'Report on Explorations in Central America' (Smithsonian Inst. Report, 1867); A. Berg, 'Die Wichtigste Geographische Litteratur,' critical as well as bibliographical; J. H. Bransford, 'Report on Explorations in Central America in

1881' (Smithsonian Inst. Report, 1882); Bureau of the American Republics. Monthly Bulletins (Washington: Government Printing Office, 1902 and 1903); also, 'The Republic of Guatemala' (Special Bulletin, February 1897); F. Catherwood, 'Views of Ancient Monuments in Central America, etc.'; P. W. Chamberlain, 'Volcanoes of Nicaragua.' (Bulletin Int. Bureau Am. Republics, December 1902, p. 1623); R. Cronau, 'Amerika. Die Geschichte seiner Entdeckung, etc.'; O. T. Ferrer, 'The Republic of Salvador' (address delivered at Buffalo, 25 Oct. 1901); R. T. Hill, 'Cuba and Porto Rico, with the other islands of the West Indies. For geological features of the Caribbean region: F. H. A. von Humboldt, 'Essai Politique sur le Royaume de la Nouvelle-Espagne'; for projected inter-oceanic canals, etc. Also 'Cosmos': the chapter on oceanic discoveries, etc. Juarros, 'Compendio de la Historia de Guatemala' (1808–18; also London 1823); A. Maure, 'Memorias Para las Historia de la Revolucion, etc.' (Jalapa 1832); 'Memoria Presentada al Soberano Congreso Nacional, por el Ministro de Gobernacion' (Tegucigalpa, 1903); 'Mensaje Dirigido . . . por el Presidente de la Republica de Honduras. El Pabellon de Honduras,' (10 Jan. 1903); G. Neiderlein, 'The Republic of Costa Rica.' (Pub. by Philadelphia Commercial Museum); J. L. Stephens, 'Incidents by Travel in Central America, etc.' (1841); G. F. von Tempsky, 'Mitla . . . A Journey in Mexico, Guatemala, and Salvador.' (London 1858); 'Costa Rica: the Land, its Resources, and its People' (1895).

MARRION WILCOX,
Authority on Latin-America.

Cen'tral City, Colo., a city and county-seat of Gilpin County, situated on the Union P. R.R., 20 miles southwest of Boulder. It lies in a gold-mining district of the Rocky Mountains and its industries are chiefly connected with the development of the mines, which have been worked for about half a century. Pop. (1900) 3,114.

Central College, a coeducational institution in Fayette, Mo., organized in 1857, under the auspices of the Methodist Episcopal Church South; reported at the end of 1902: professors and instructors, 10; students, 201; volumes in the library, 6,500; value of all property, $320,000; acting president, T. Berry Smith, A.M.

Central Falls, R. I., a town in Providence County, situated on the Blackstone River, and the New York, N. H. & H. R.R., 4½ miles north of Providence. It has a number of large manufacturing establishments, with an aggregate capital of $3,389,000, including cotton, woolen, silk, and leather factories. The river supplies excellent power. There are several churches, newspapers, and a national bank. Pop. (1900) 18,167.

Central Force, a force which constantly urges the body upon which it acts toward the same fixed point or "centre." Central forces are specially important in physics and mechanics, because systems in which the forces are all of this character are "conservative." See DYNAMICS; ENERGY, CONSERVATION OF.

Central India Agency, the official British term for a collection of states in Hindustan, consisting of four groups or agencies, namely, Bundelkhand, Bhaghelkhand, Gwalior, and Nimar and Malwa, covering an area of 77,808 square miles, under the ultimate charge of the governor-general's agent at Indore. The largest individual states are Gwalior, Indore, and Bhopal. Pop. (1901) 8,501,883.

Central Park, the most noted park in New York city. It contains 840 acres and extends from 59th Street to 110th Street, and from Fifth Avenue to Eighth Avenue. In 1856, the year of its purchase by the city, the land now constituting Central Park was occupied by shanties, bone-boiling establishments, piggeries, and pools of offensive stagnant water which rendered the neighborhood anything but park-like. The first full year's report of the men who were given the work of turning this ground into a park, contains the following description of its condition:

"It was already a straggling suburb, when purchased by the city, and a suburb more filthy, squalid and disgusting can hardly be imagined. A considerable number of its inhabitants were engaged in occupations which are nuisances in the eyes of the law and forbidden to be carried on so near the city. They were accordingly followed at night in wretched hovels half hidden among the rocks.

"During the autumn of 1857, 300 dwellings were removed or demolished by the commissioners, together with several factories and numerous 'swill milk and hog-feeding establishments.' Ten thousand loads of stone were also taken off the land and used to build a rough enclosing wall."

This description helps one to appreciate the vast amount of work, and artistic planning which has been necessary to bring the park to its present state of beauty and attractiveness, and it is interesting to see how fully the prophecy of a park commissioner, who wrote in 1868, has been fulfilled:

"But we who are in the middle of life," he says, "can never know all its beauty. That is reserved for those for whom we have planted these shrubs and trees, and spread these level lawns. These trees will arch over many happy generations, and thousands who are not yet born will enjoy the sweet green of the grass; and it will ever habitually serve to keep the memory of its founders green."

The central site was finally selected despite its unpromising topography, in preference to the one first proposed at 66th Street on the East River — the Jones' Wood site — because it was central and spacious. It was also thought that the great expense of turning it into building lots — the extensive filling of low, swampy ground, and blasting away of ledges — would enable the city to purchase the land at a low figure. Including a number of acres of water surface, comprising the two reservoirs belonging to the Water Department, the cost was about $7,500 an acre. The total acreage, including the subsequent extension to 110th Street, was 843, and the price paid $6,348,959.90.

There has been spent in bringing the park to its present condition somewhere between $25,000,000 and $30,000,000.

The special committee appointed by the Board of Aldermen to select the most desirable park site pronounced emphatically in favor of "the Central Park," stating their opinion that "it could be made to compare favorably with

the most celebrated public grounds of the chief cities of Europe, not excepting Hyde Park of London, the Champs Elysées of Paris, the Prater of Vienna, the Cascine of Florence, the Corso of Rome, the Prado of Madrid, or even on the American continent, with the spacious plazas of Havana or the lovely botanical gardens of Rio de Janeiro."

It was freely predicted by the opponents of the park that it would prove a white elephant on the hands of the city; that it could never be made into a decent-looking park, and was an unnecessary extravagance which the city did not need and could not afford.

The largest settlement of the park seems to have been along the Eighth Avenue side. Mount St. Vincent was included within the park borders, situated just west of Fifth Avenue at 105th Street, on the old Boston post road, which ran diagonally through the park. The land and buildings (now the headquarters of Commissioner Wilcox) forming the State arsenal, were subsequently purchased by the city and added to the park in 1867, the price paid being $275,000.

Owing to the lack of funds no work was done in improving the land until 1857. In April of this year the legislature authorized the issuance of bonds and in the following June a tentative beginning was made on the park. Preliminary surveys had been carried out by Egbert L. Viele, the first engineer to the commissioners, but they soon decided that it would be desirable to offer a series of prizes to outside architects for designs for the formal laying out of the land. In 1857 such an announcement was made and on April 1, 1858, 30 designs were submitted. That of Messrs. Olmsted & Vaux was chosen, and they were awarded the first premium of $2,000. In 1857 Mr. Olmsted had been appointed superintendent to the board; George E. Waring, agricultural engineer; Samuel I. Gustin, nurseryman, and several other landscape offices had been created and filled.

In 1858 Mr. Olmsted was promoted to architect-in-chief at a salary of $2,500 a year, and the other offices abolished or subordinated to his.

The work of putting the successful design into execution was begun by Mr. Olmsted, Calvert Vaux, and J. W. Mould in June 1858. The original plan has been pretty closely adhered to, during the 40 odd years of the park's existence, although there have been times when strong efforts were made to alter it, and even to remodel some of the previous work. In 1871 when the Central Park commissioners were legislated out of office, and a board of public parks for the whole city instituted, such an attempt was made, one of its features being an extensive thinning of the trees.

Until 1871 the history of the park was an uneventful one. Most of the commissioners had served on the board since its first year, and except for family squabbles over the details of management and construction, the improvements were carried on without interruption practically in the entire charge of Mr. Olmsted. The difficulties which began to interfere with the efficiency of the department after its political organization in 1871 are indicated by the following extract from a pamphlet by Mr. Olmsted, who was subsequently made a commissioner and president of the board shortly prior to his dismissal:

"As superintendent of the park," he says, "I once received in six days more than 7,000 letters of advice as to appointments, nearly all from men in office." Delegations from various political organizations came to find out "what share of his patronage they could expect," and in order to make him as little trouble as possible in its parceling out "they took the liberty to suggest that there could be no more convenient way than that you should send us our due quota of tickets, if you please, sir, in this form, leaving us to fill in the name." Here a pack of printed tickets was produced, which proved to be blank appointments, bearing the signature of Mr. Tweed. "That," continued the spokesman of the delegation, "was the way we arranged it last year, and we don't think there can be anything better."

There seems to have been some misconception, during the early years of the park, as to its real purpose, and considerable jealousy of its regulations. In April 1864, for instance, one of the regiments of the first division of the National Guard, despite the vehement opposition of the park keepers, marched through one of the gates and proceeded to drill upon the green. Another regiment subsequently attempted to do the same thing.

An interesting item in the report for 1863 is the announcement that 14 European sparrows, "*moineau* of France," were let loose in the park in the spring of that year. This original 14, apparently the pilgrim fathers of the present local settlement, must now be represented by several million.

The paving of Fifth Avenue up to the park was completed in 1863. Previous to this, especially in wet weather, the approaches had been extremely bad, and the completion of the Fifth Avenue paving led to an immediate increase in the use of the park for driving. In its early days guards were stationed at each of the park gates, and a part of their duty was to count the number of persons passing in. In 1861 the result of the count was 1,863,263 pedestrians, 73,547 equestrians, and 456,849 carriages, the total number of visitors being estimated at 2,404,659.

"For the purpose of ascertaining the nature of the existing vegetation," says the first annual report (1857-8), "a botanical survey of the park has been made. First, to learn how far it can be made available in the projected improvements and to ascertain what plants will prove most flourishing if transplanted to this ground, and second to discover what alterations the soil will require in order to admit of an increased variety."

This report details about 70 species of trees, shrubs, and vines. Among the trees were included maples, beech, dogwood, chestnut, catalpa, red birch, persimmon, ash, locust, black walnut, red cedar, sweet gum, sycamore, poplar, American aspen, oak, and elm. All told, there were about 150,000 trees and shrubs.

Regarding the present vegetation there seems to be no available data, no continuous record of the planting having been kept nor any detailed botanical study of it made during recent years.

The soil of the park was never good in quality, nor abundant enough to support the veg-

egation of a park. For this reason the public had to be excluded from the meadows and lawns, as a single day's trampling of the grass nearly destroyed it. In 1903 a systematic renovation of the soil was undertaken, and continued until nearly the whole planted area was covered with loam, carted from Long Island, at an expense of upward of $2,000,000.

Central Provinces, a part of British India, presidency of Bengal, occupying a position about the middle of the peninsula. Their total area is computed to be 115,936 square miles, of which 86,617 square miles are British territory, and the rest the territory of native protected states, 15 in number. They contain much waste land and jungle and the cultivated area is small, little more than one fourth of the British territory being turned to account, and more than one half of the remainder being uncultivable. The district of Narbada is admirably adapted for the cultivation of the sugarcane, of cotton, and of wheat, and it contains coal and iron. Nagpur has extensive cotton fields, contains the celebrated cotton market Hinganghat, and the valley of the Wainganga, farther east, grows maize, wheat, and rice. The most important manufactures are weaving and working of iron ore. These provinces became a separate administration in 1861, and are under the authority of a chief commissioner. For administrative purposes they are divided into four commissionerships, Jabalpur (Jubbulpore), Nagpur, Narbada (Nerbudda), and Chhattisgarh (Chutteesgurh), and these contain 19 districts.

Central University, a co-educational institution in Pella, Iowa, organized in 1853, under the auspices of the Baptist Church; reported at the end of 1901: professors and instructors, 15; students, 83; volumes in the library, 5,000; grounds and buildings valued at $60,000; productive funds, $24,000; benefactions, $1,500; income, $5,350; president, Asa B. Bush, Ph.D.

Central University of Kentucky, a co-educational institution at Danville, Ky., under the auspices of the Presbyterian Church. It was given its present organization in June, 1901, by the consolidation of the Centre College of Danville (founded 1822) and the Central University of Richmond (founded 1874). Number of instructors reported, 107; number of students, 1,205; volumes in the library, 25,000; total value of property, $1,500,000; president, W. C. Roberts, D.D.

Central Wesleyan College, a co-educational institution in Warrenton, Mo., organized in 1864, under the auspices of the Methodist Episcopal Church; reported at the end of 1902; professors and instructors, 18; students, 294; volumes in the library, 7,000; grounds and buildings valued at $100,000; productive funds, $70,000; income, $10,300; president, George B. Addicks, A.M.

Centra'lia, Ill., a city of Marion County, situated on the Illinois Cent. R.R., and several other railroads, 105 miles north of Cairo. It is in a fruit-raising and mining region and is largely occupied in iron and steel workings. The city has several parks and a public library. Pop. (1900) 6,721.

Centraliza'tion, the placing in the hands of a central government jurisdiction over matters which might be under the management of local authorities. The term is used to denote the increase of power of a central authority already established, or the closer union under a central power of a confederation of partially independent States. The adoption of the Constitution of the United States was centralization in the latter sense. The question of centralization in the first sense has been an important one in United States history, forming the point of dispute between the first two political parties, and being a frequent subject of discussion at all times. The question as applied to the United States is whether to interpret the Constitution liberally, and give the national government power in doubtful cases; or whether to put a close construction on the Constitution and give the States the benefit of the doubt.

Centrarchidæ, sĕn-trär'kĭ-dē, a family of fresh-water percoid fishes, confined to North America. The body is generally short, deep, and compressed, with an equal curvature above and below, and covered with rather large, strongly ctenoid scales. The mouth is terminal, variable in size, with the premaxillary protractile, and numerous fine, close teeth on all of its bounding bones. Both dorsal and anal fins are long, with 6 to 13 strong, sharp spines in the anterior part of the former, and 3 to 8 in the latter. All are active, pugnacious, carnivorous fishes, many of which build nests. They are important game and food fishes of small or moderate size, of which about 12 genera and 30 species are known, almost all of which are confined to the Mississippi valley and the eastern United States, where they are almost the most characteristic fishes. The most important are the grass bass, black bass, rock bass, warmouth, and sunfishes (qq.v.).

Centre, a point equidistant from the circumference of a circle or from the superficies of a sphere; also the middle point of any superficies or solid.

Centre-board, a contrivance used in a yacht or shallow, keelless, or flat-bottomed vessel, to counteract the tendency to make leeway and to enable the craft to stand up under press of sail. It consists generally of a quadrangular wooden or iron plate which is bolted or hinged by its lower forward corner into a trunk or casing which fits, water-tight, over a fore-and-aft slot in the vessel's bottom, about midway of her length. When running before the wind or in shallow waters the centre-board is hauled up inside the trunk. When on a wind, or with the wind abeam, the centre-board is lowered, presenting a broad surface to the water on the same principle as a lee-board (q.v.). The term centre-board is essentially American; elsewhere the contrivance is known as a sliding-keel. See YACHT AND YACHTING.

Centre of Buoyancy. The pressures which act on every point of a surface immersed in a fluid can be resolved into horizontal and vertical components. The former balance each other. The resultant pressure must therefore be vertical; and, as the pressure increases with the depth, it is clear that the upward pressures must be greater than the downward. Hence the resultant pressure on an immersed body must be a force acting vertically upward. It is easily shown that the magnitude of this pressure is equal to the weight of the fluid displaced. The

point in the displaced fluid at which the resultant vertical pressure may be supposed to act is called the centre of buoyancy, or centre of displacement. Hence, we see that when a body floats in a fluid it is kept at rest by two forces, the weight of the body acting downward through its centre of gravity, and the weight of the fluid acting vertically upward through its centre ot gravity or centre of buoyancy. The relative positions of the centre of gravity and the centre of buoyancy have an important bearing on the safety of ships at sea. If the centre of buoyancy be above the centre of gravity, the equilibrium is stable; in other words, if the ship is displaced, it will tend to return to its original position. If, on the other hand, the centre of buoyancy be below the centre of gravity, the equilibrium will generally be unstable, although a body may float in stable equilibrium even if the centre of buoyancy be below the centre of gravity.

Centre College, Danville, Ky. See CENTRAL UNIVERSITY OF KENTUCKY.

Centre of Gravity, or **Centre of Inertia,** a point in a body, or in a system of bodies, which in modern works on mechanics is usually and preferably called the "centre of mass." See MASS.

Centre of Gyration. See PENDULUM.

Centre of Inertia. See CENTRE OF GRAVITY.

Centre of Oscillation. See PENDULUM.

Centre of Percussion. See PENDULUM.

Centre of Population, the centre of gravity of the population of a country, each individual being assumed to have the same weight. The centre of population in the United States has clung to the parallel of 39° lat. and has moved in a westward direction during the last 110 years. The following table shows the movement of the centre of population since 1790:

Years Census	North Latitude	West Longitude
1790	39° 16.5′	76° 11.2′
1800	39 16.1	76 56.5
1810	39 11.5	77 37.2
1820	39 5.7	78 33.0
1830	38 57.9	79 16.9
1840	39 2.0	80 18.0
1850	38 59.0	81 19.0
1860	39 0.4	82 48.8
1870	39 12.0	83 35.7
1880	39 4.1	84 39.7
1890	39 11.9	85 32.9
1900	39 9′36″	85 48′54″

Centre of Pressure. See HYDROSTATICS.

Centreing, or **Centering,** the framing of timber by which the arch of a bridge or other arched structure is supported during its erection. See BRIDGE.

Centrifugal Force, a force which continually tends to fly from a given fixed point or centre; opposed to centripetal force (q.v.).

Centrifugal Machines, machines used for various purposes, in which centrifugal force produced by rapid revolution is utilized. Such a machine may be used for drying clothes or other goods, the articles being placed inside a hollow cylinder made of wire-gauze or with numerous perforations in its circumference, which, being driven at a high speed, the moisture is caused to fly off by centrifugal action. Sugar is now often separated from the molasses by a centrifugal machine, the product being commonly known by the trade name of "centrifugal sugar." The cylinder in which the sugar is contained is placed within a larger cylinder in which the molasses is received. Liquids such as beer, can also be clarified and cleared of foreign substances by means of centrifugal action, the extraneous matters being made to collect at the circumference of the vessel through the high rate of speed at which it is driven, while the clear liquid can be drawn off by an outlet at the centre. Cream is now commonly separated from milk in large dairies by the same method. See BUTTER.

Centripetal Force, a force which tends continually toward a given fixed point, or centre; a "central" force. See DYNAMICS; ENERGY, CONSERVATION OF.

Centumviri, judges of ancient Rome, three from each tribe, who determined ordinary causes. The extent of their jurisdiction is uncertain. Hollweg would confine it to civil cases; it seems probable that they at first handled questions relating to quiritarian ownership, which determined the status of the citizens.

Centuries of Magdeburg, a history of the early Christian Church, so called because it was divided into centuries, each of the 13 volumes containing a hundred years, and was first written at Magdeburg. Matthias Flacius formed the plan of it in 1552, but the last volume did not appear until 1574. It is the first comprehensive work of the Protestants on Church history; its main purpose was to prove the agreement of the Lutheran doctrine with that of the primitive Christians, and the difference between the latter and that of the Roman Catholics.

Centu'rion, a Roman army officer who commanded a century, or body of 100 men. The rank of a centurion corresponded very nearly to that of a captain in modern armies. See LEGION.

Centuripe, chĕn-too-rē'pā, Sicily, a town in the province of Catania, situated on a height above the valley of the Simeto, 20 miles northwest of Catania. It is situated in a district yielding soda, sulphur, and marble. The ancient city (Centuripa), considerable ruins of which exist, was at one time among the important cities of Sicily. Pop. 11,000.

Cen'tury, in chronology, a period of 100 years. Modern chronology of Christian nations centres at the birth of Christ, and the centuries are numbered according to their order either before or after that event, for example, the 20th century A.D., the 4th century B.C.

In Roman times, (1) a division of 100 men in the army, corresponding to the modern company, 60 of which formed a legion; (2) a division of the six classes of the people, introduced by Servius Tullius, for the purposes of taxation and voting.

Century-plant, a popular name of the *Agave americana,* or American aloe. See AGAVE.

Ceo, Violante do, vē-ō-lān'tā dō thā'ō. Portuguese poet: b. Lisbon 1601; d. 1693. She was styled "the tenth Muse." Her 'Portuguese

Parnassus' and miscellaneous poems are greatly admired.

Ceorl, chĕrl. See CHURL.

Ceos, sē'ŏs, or **Kea,** kā'ä (sometimes called by the Italianized name of *Zea* or *Tzia*), an island in the group of the Cyclades, in the Ægean Sea, 13 miles off the coast of Attica. It is 13 miles long, 8 broad and 39 square miles in area. The central and culminating point is Mount Elias, 1,863 feet high. It is fairly fertile, raising fruit, wine, honey, and valonia. In ancient times Ceos was noted as the birthplace of the poets Simonides and Bacchylides, and the physician Erasistratus; and the Cean laws were famous for their excellence. The capital is Ceos.

Cephaelis, sĕf-ą-ē'lĭs, a genus of plants belonging to the order *Rubiaceæ,* natives of tropical America. The roots of *C. ipecacuanha* furnish the commercial drug of that name. See IPECAC.

Cephalaspis, sĕf-ąl-ăs'pĭs, a genus of ostracoderms (q.v.) of the Devonian Period, characterized by a semicircular or semioval head-shield, with spines at the angles. It has a curious superficial resemblance to the head-shields of certain trilobites.

Cephalization, sĕf-a-lī-zā'shŭn, a principle advanced by Dana, who claims that cephalization is simply domination of the head — cephalic domination — in an animal, as manifested in the structure; and any degree of it depends on the grade or power of the cephalic centre and the degree of subordination to it in the structure. He agrees that since animals have a head as their grand characteristic feature, and a brain as the fundamental element of the head and the prime centre of force in the organism, exaltation and concentration anteriorly of the life-forces mark a high grade of cephalization. Their concentration of parts anteriorly, with exaltation of the cephalic end of the body, is manifested not merely in the transfer of members to the cephalic series, but also in the form and structure of the head, of the sense-organs, the mouth-appendages, the legs and abdominal appendages.

The principle is most clearly shown by the increased size and specialization of the head of the crab and the corresponding reduction of the abdomen as compared with the elongated abdomen of the lobster and shrimps, as well as the relations of the head to the thoracic and abdominal regions in the amphipod and isopod *Crustacea.* It should be observed that in arthropods in general, at the beginning of embryonic life, development begins with the head, thus in *Limulus, Arachnida, Crustacea,* and insects, the head is the first to become developed; its segments and appendages arise before those of the hind body. It is so in the vertebrates, the head at first forming the bulk of the body. This is the case with annelid worms, etc., in their larva, the trochosphere (q.v.), the bulk of the body is formed by the head. It is not improbable that the cause of the large size of the head in the embryos of all the higher animals is in some way connected with the fact that development begins at the anterior end. On the other hand the new segments later in embryonic life in worms and arthropods arise at the growing-zone, which is situated at the end of the hind body, between the penultimate and terminal segments of the body.

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Cephalochorda, sĕf"ą-lō-kôr'dą, a group of *Chordata* (q.v.) represented by the lancelet or Amphioxus (q.v.). Other names for the young group are *Leptocardii* and *Acrania.* The *Cephalochorda* are fish-like in shape, and have a notochord extending the length of the body, beginning in the head; hence the name *Cephalochorda.* The notochord is situated between the nervous system and the digestive canal. The central nervous system lies entirely on one side of the digestive canal, while numerous gill-slits extend from the pharynx to the exterior.

Cephalodiscus, sĕf-ą-lō-dĭs'kŭs, a very puzzling animal now placed in the subphylum *Enteropneusta* (*Hemichordia*), along with *Balanoglossus* (q.v.). It is a deep-sea form, and at first was mistaken for a large polyzoan, which it strikingly resembles. It is like *Balanoglossus* in being divided into three regions, that is, a proboscis, a collar, and the main trunk, which is very short; but it is not worm-like in general appearance. Its place among the chordates is due to the presence of a structure resembling a notochord, with the same relations to the nervous system as in *Balanoglossus.* It differs however, from the latter animal in the possessing tentacles arising from the collar, and in the digestive canal being bent on itself as in the *Polyzoa,* so that the vent is situated near the mouth; and it has only a single pair of openings supposed to represent the gill-slits. These creatures occur in colonies, secreting a common branching case somewhat like that of *Polyzoa,* and it multiplies by budding.

Cephalonia, sĕf-ą-lō'nĭ-ą, or **Kephallenia,** an island of Greece, the largest of the Ionian islands, northwest of the Morea, at the entrance of the Gulf of Patras, about 31 miles in length, and from 5 to 12 in breadth; area, 302 square miles. The coastline is very irregular and deeply marked with indentations, and the surface is rugged and mountainous, rising in Monte Negro, the ancient Ænos, to a height of 5,380 feet. There is rather a deficiency of water on the island. The principal towns are Argostoli, the capital, and Lixuri. The chief exports are currants, oil, and grain; wine, cheese, etc., are also exported. The manufactures are inconsiderable, consisting of some cottons, carpets of mixed wool and goats'-hair, with some potteries and distilleries of liqueurs. The island is subject to frequent earthquakes. One of the most destructive was that of the year 1867. The greater part of the population are of the Greek Church; the others belong to the Catholic Church. By Homer the island was called Same or Samos, though he speaks of the inhabitants as Cephallenes. The island adhered to Athens during the Peloponnesian war. In 189 B.C. it came under the Roman dominion and after the division of the empire, it became subject to the Byzantines. In the 12th century it was taken by the Normans, and afterward fell successively into the hands of the Venetians and Turks, and then again into the hands of the Venetians, who retained possession of it until 1797, when the French seized it. From 1815 it belonged to the Republic of the United Ionian Islands, and in

1864 was united with the other islands to the kingdom of Greece. With Ithaca and a few other adjacent islands it forms a nomos or province of the kingdom of Greece. Pop. of nomos 83,363; of the island about 72,800.

Cephalop'oda, a class of mollusks represented by the squid, cuttle-fish, octopus, nautilus, argonauts, etc. In these mollusks the head-lobe bears arms or tentacles, as the animal has no "foot" or creeping-disk like that of other mollusks, though its homologue is found in the siphon and tentacles. They have an unpaired muscular mantle, which forms the walls or outside, so that as in the squids, where there is no outer shell, the body is naked. The nervous system is much concentrated, for not only are the cerebral ganglia, pedal, and visceral ganglia in the head, but also the ears and osphradia, or olfactory organs. The large complicated brain, thus composed of the three primary pairs of ganglia with some accessory ones, are enclosed in a cephalic cartilage which suggests a comparison with the cartilaginous skull of the lamprey and sharks. In the body behind are the sympathetic and stellate ganglia. The eyes as a rule are highly developed, with a retina, choroid, iris, cornea, vitreous body, and lens. The gills are well developed, either as one or two pairs situated within the mantle-cavity. The water is forced from the mantle-cavity, which is open behind the head, through the siphon. There are two kinds of hearts. The systematic heart consists of two or four (nautilus) auricles receiving the blood from the gills, and a median ventricle from which arise the anterior and posterior aortæ. There is also, at the base of each gill, a branchial heart, which receives the blood from the vena cava and pumps it into the gill. These branchial hearts are not known to exist in other mollusks, and no other mollusks possess an ink-sac. The armature of the mouth, however, as in gastropods, consists of two horny teeth, enormous in most cephalopods, and an odontophore with its lingual ribbon for cutting flesh, etc. The eggs in developing undergo a superficial or discoidal development; and the young undergo no metamorphosis. The shell of cephalopods is either chambered, as in orthoceratites, nautiloids, and ammonoids, or, as in argonauts, forms a simple deep basin. In the squids and cuttle-fish the body is supported by an internal pen or "bone."

The cephalopods are divided into two orders, according to the number of their gills.

Order 1. *Tetrabranchiata.*—This group, in which the gills are four in number, is represented by the nautilus, the sole living representative of a number of fossil forms, such as *Orthoceras, Goniatites* and *Ammonites. Nautilus pompilius* and *Nautilus umbilicatulus* are the only survivors of about 1,500 extinct species of the order. See NAUTILUS.

Order 2. *Dibranchiata.*—The dibranchiates are so called from possessing but two gills, while the tetrabranchiates had, as in *Nautilus,* numerous unarmed tentacles; these are now represented by 10 (*Decapoda*) or 8 (*Octopoda*) arms, provided with numerous suckers. To the 10-armed forms belong *Spirula,* a diminutive cuttle with an internal coiled shell. The shells of *Spirula peronii* are rarely thrown ashore on Nantucket; it lives upon the high seas. The extinct Belemnites had, like the recent *Moroteuthis,* a straight conical shell, the "thunderbolt" fossil. Allied to *Loligo* and *Ommastrephes* are gigantic cuttle-fishes which live in mid-ocean, but whose remains have been found at sea or cast ashore on Newfoundland and the Danish coast. Their jaws also occur in the stomachs of sperm whales.

Fossil Cephalopods.—The greater proportion of cephalopod mollusks are fossil. They began to exist in the Cambrian Period, and, as nautiloids and ammonoids, flourished in great profusion in the Palæozoic and Mesozoic eras, the ammonites (q.v.) of the Jurassic and Cretaceous beds numbering about 5,000 species.

Cephalula, sĕf-ạ-loo'la, the name applied by Packard to the stage of the embryos of mollusks and of worms immediately succeeding the gastrula (also the trochosphere) when the larva is still a surface-swimmer and the head is beginning to be formed. Consult Packard 'Life-Histories of Animals,' p. 94.

Cephalus, sĕf'ạ-lŭs, the son of Creusa; according to some the son of Deion, king of Phocis, and of Diomede. He was the husband of Procris, or Procene. Shortly after his marriage Eōs (Aurora) carried off the beautiful youth while he was hunting on Mount Hymettus. He refused the love of the goddess, who induced him to put the virtue of his wife to a trial which it could not withstand. Procris, in return, tempted him likewise, and he yielded also. Learning their mutual weakness, they became reconciled. But Procris subsequently became jealous of her husband, and concealed herself in a wood to watch him. He mistook her among the leaves for a wild animal, and killed her with a javelin.

Cephas, sē'fạs, a surname given by Christ to Simon. In the Greek it is *πέτρος* ("a rock"), in Latin *Petrus,* and in English Peter.

Cepheus, sē'fūs, a king of Ethiopia and husband of Cassiopeia; his name was given to a constellation of stars in the northern hemisphere, surrounded by Cassiopeia, Ursa Major, Draco, and Cygnus.

Cephis'sus, the name of three rivers of Greece. (1) A river which waters the Athenian plain. It rises on the west slope of Mount Pentelicus and the south side of Mount Parnes, and flows past Athens on the west into the Saronic Gulf near Phalerum. (2) A river of Attica emptying into the Gulf of Eleusis. (3) A river flowing through eastern Phocis and northern Bœotia and emptying into Lake Copais (Topolias).

Ceracchi, Giuseppe, joo-sĕp'pĕ chā-rä'kē, Corsican sculptor: b. on the island of Corsica, 4 July 1751, or, according to others, about 1760; d. Paris 29 Jan. 1801. In 1798 he took part in establishing the republic at Rome, of which he was among the warmest partisans. On the re-establishment of the papal authority he was obliged to leave Rome, and went to Paris, where he was employed in making a bust of the First Consul. Nevertheless, he joined the young French artists whom he had known at Rome, and whose ardent republican opinions coincided with his own, in a conspiracy against Bonaparte, in whom he saw only the oppressor of his country. On 9 Nov. 1800, he was arrested at the opera, with Arena, Damerville, and Topino Lebrun. Before the tribunal he answered only in

monosyllables to the questions put to him. He was sentenced to death, together with his accomplices, and ascended the scaffold with great firmness. The death of this disciple, and almost rival, of Canova, was a great loss to sculpture.

Ceram, sĕ-răm′, or **Ceiram,** called by the natives Zeram or Serang, an island of the Moluccas, the second of the group in size, lying west of New Guinea; in the Indian Archipelago; area about 7,000 square miles. Its interior is very imperfectly known, but it is understood to be traversed by mountain ranges from 6,000 to 8,000 feet high, and culminating in Noosaheli, which is 9,250 feet. The vegetation is luxuriant and gigantic, some of the sago-palms growing 100 feet high. Sago forms the chief food of the inhabitants and is an article of trade. The inhabitants of the coast are of Malay origin, and have extensive fisheries. The interior is peopled by Alfoories or Alfuros, long known for their barbarous custom of using human skulls for public and private ornament, and the still more barbarous atrocity of committing murder in order to procure them. They are said to have become more civilized, and many of their rajahs have adopted the European dress and manners. They are divided into various independent tribes. Christianity has been introduced into several villages on the south coast, but not with any great success, though it is said that in some of the villages a considerable number of those professing Christianity can now read and write. The island belongs to the Dutch, who have established several stations there under the charge of an official residing at Wahai on the north coast. Pop. estimated at 195,000.

Cerambycidæ, sĕ-răm-bis′ĭ-dē, a family of beetles of great extent, readily known by their very long antennæ, which give its members the name of "longicorns." The family already numbers some 12,000 or 13,000 species, though probably not over half of the existing forms are known. It comprises some of the largest, most showy, as well as the most destructive insects of the sub-order. They are readily recognized by their oblong, often cylindrical bodies, the remarkably long, filiform, recurved antennæ, and the powerful incurved mandibles. Their eggs are introduced into cracks in the bark of plants by the long, fleshy, extensile tip of the abdomen. The larvæ are long, flattened, cylindrical, fleshy, often footless, whitish grubs, with very convex rings, the prothoracic segment being much larger and broader than the succeeding, while the head is small and armed with strong, sharp mandibles adapted for boring like an auger in the hardest woods. These borers live from one to three years before transforming, at the end of which time they construct a cocoon of chips at the end of their burrows, the head of the pupa lying next to the thin portion of bark left to conceal the hole.

The species of the American genus *Oncideres* are called girdlers, because the parent beetle, after laying an egg in a small branch, girdles this round with a deep incision, so that the portion containing the larva sooner or later falls to the ground. The growth of a longicorn larva frequently takes more than a year, and under certain circumstances it may be enormously prolonged. *Monohammus confusus* has been known to issue from wooden furniture which was 15 years old. Individuals of another longicorn have issued from the wood of a table 20 and even 28 years after the felling of the tree from which it was made. Watson has related a case from which it appears probable that the life of a longicorn beetle dwelling in household furniture extended over at least 45 years. It is generally assumed that the prolongation of life in these cases is due to the beetle resting quiescent long after it has completed the metamorphosis; but more probably it is the larval life that is prolonged; the larva continuing to feed, but gaining little or no nutriment from the dry wood in these unnatural conditions. A large number of longicorns stridulate loudly by rubbing a ridge inside the pronotum on a striate surface at the base of the scutellum. A few produce noise by rubbing the hind femora against the edges of the elytra, somewhat after the fashion of grasshoppers; and some possess highly developed stridulating surfaces on the hind and middle coxæ.

Ceramics. The operations of the clay worker rank among the most ancient of those undertaken by man and are, with the single exception of agriculture, the most widely spread. The origin of the art is lost, but it is quite certain that in prehistoric times the plasticity of clay had been remarked and made use of. The first clay work probably consisted of brick, and these were at first sun dried. (See BRICK.) Of sun-dried pottery but few examples remain, and the fact that such wares could not be employed to hold liquid prevented a very extensive use of unburned pieces. The knowledge that clay could be hardened and made impervious by burning must be ranked as a discovery distinct from that of shaping the plastic clay. It is not unlikely that the funeral pyre revealed the secret. Vases and jars have been found in the British barrows or tumuli which have apparently been burned only in the fire by which the body was consumed.

Clay work was originally formed by hand alone, the method followed being similar to that still practised by certain tribes of Indians. A plastic clay was worked and kneaded to render it homogeneous and was then rolled into long thin strips. These were coiled in a spiral form and the joints made good by pressure until the desired size and shape was reached. The invention of the potters' wheel marks an epoch in the history of the art and wherever the wheel became known it entirely superseded the older method. Some peoples, however, never learned of the wheel, but brought their own craft to great perfection. The wheel is of very ancient date. Dr. Birch ('Ancient Pottery') states that the Egyptians attributed it to the power of the gods. Num, the creator, used it for the formation of the human race. (See POTTERS' WHEEL.)

In modern times the wheel has given way to the mold as a means of giving shape. (See POTTERY.)

Among early workers natural clay was used and their wares are colored, the single exception being Chinese porcelain. (See PORCELAIN.) The first traces of pottery are found in Egyptian hieroglyphics, where vases, evidently wheel-made, are depicted in the writing. The vases themselves of various dates are to be found in museums and the recent excavations by Dr. Flinders Petrie have added much to our know-

ledge of Egyptian work. In Babylonia and Assyria the main interest lies in the fact that clay was used as a means of writing. Clay tablets and cylinders were prepared and with angular punches the cuneiform characters were impressed. The tablet being fired the writing became indelible. Vast stores of these clay records have been discovered and are being deciphered.

In Greece the fictile art was developed in a remarkable degree. A high standard of criticism prevailed and the arts reached great perfection. Greek pottery ranges from 700 to 200 B.C. The early work was crude, almost barbaric. The clay was of a pale salmon tint deepening to a warm brown. Upon the polished surface decorative patterns were traced in black. Geometric designs occupied the attention of one section, others attempted a more florid treatment developing into silhouettes of birds and animals. The human figure eventually prevailed and scenes from mythology and local history appeared. The great change came when, instead of black figures on a red background, the figures were outlined and the background painted in black. This enabled details of feature and drapery to be executed with rare fidelity, and the culminating point of Greek pottery was reached. There are some 15,000 Greek vases in existence and the larger number of them are of superior workmanship.

The pottery of the Romans exists in great abundance, but few pieces are remarkable for excellence of workmanship. The Romans possessed an abundance of glass and the rude pottery of the household was displaced at the table of the patrician. Roman pottery is remarkable for its wide distribution. Their armies seem to have been regularly accompanied by potters. Germany, France, and Great Britain are covered with fragments of Roman wares made for the most part from local clay. A remarkable variety of pottery is that known as Samian, or more correctly, as Aretine ware. This is made of clay of a brilliant red color, and as molds and waste pieces have been found in England and France the presumption is that the clay as well as the workman was imported. No such clay is known to exist now and the wares are all made of the same material. The Roman «slip painted» or Castor ware was the ancestor, though after a long interval, of the English clay decorated pieces which gave the potter's art so firm a hold on the English people and eventually brought the knowledge of clay working to the American colonists.

In the far East a different line was being wrought out. The pottery of India and Persia was the descendant of Egyptian blue-glazed ware. The characteristic which distinguishes these wares from the productions of Greece and Rome is the glaze. Very early in the history of the art it was found necessary to use some impervious coating before the pottery could be extensively used, but in the East a covering of glaze was used for its decorative effect. This fact led to an important development. A glaze upon brown or red clay is not always pleasing, and therefore the expedient was adopted of coating the clay with a light-colored slip or engobe. Thus Oriental engobe ware has become a recognized type of ceramic production. Each Eastern nation in turn worked on similar lines. India affected colored glazes well known in the rich blue roofing tiles of Multan. Persia adopted a delicate fanciful tracery of floral motif, the outlines being filled in with light blue and gray. A beautiful pottery, almost porcelain, was made in Persia and exported from the port of Gombron, hence known as Gombroon ware. The characteristic feature was a series of fine perforations which were filled with glaze, producing a transparent pattern upon a slightly translucent ground.

Damascus produced many fine pieces of engobe ware, the treatment being more forceful than that of Persia. In the island of Rhodes and in certain neighboring localities variety was given by the adoption of red in the decoration. This red consisted of a natural earth. The development of the peculiar colors found on this ware is due to the absence of lead oxide from the glaze. (See GLAZE.) The Arabians and Moors carried the knowledge of pottery along the north coast of Africa, and when, in the 8th century, the former people invaded Spain they brought the art with them. It was not, however, until the Moorish invasion in the 12th century, and the building of the Alhambra palace, that any great progress was made. A notable change took place in the introduction of tin oxide as a glaze constituent. The knowledge of this substance existed farther east, but in Spain both tin and lead were found in abundance. The consequence was that the intermediate coating or engobe was discarded and the glaze itself rendered opaque by tin oxide. This of course involved a different treatment of color and as the art spread from Spain to Italy the great schools of Italian Majolica grew up. (See MAJOLICA.) In France some variations took place and in Germany the main product was stoneware (q.v.).

In England the ceramic art had never been forgotten. The departure of the Romans had caused a relapse and neither Anglo-Saxon nor Norman pottery was of any importance. About the Tudor period, however, a revival took place. The potters had foregathered in Staffordshire, where there was an abundance of clay, and there they produced the slip decorated, the combed, marbled, and tortoise-shell wares which are so characteristic of the time. A great stimulus was given by the arrival of two Dutchmen named Glers. These brothers were skilful potters and speedily influenced the quality of the claywares manufactured. They, in fact, prepared the way for Josiah Wedgwood, who established the English factory system and made it possible for skilled men to combine their efforts in the production of fine pottery. See WEDGWOOD.

In America the history of the ceramic art may be conveniently, if somewhat arbitrarily, divided into four epochs. (1) The work of the aborigines. (2) From Colonial times until 1840. (3) From 1840 to 1880. (4) The present day.

The work of the natives was varied and interesting. The wheel seems never to have been used; but, on the other hand, the process of building pottery by means of coils of clay was brought to great perfection. Barber ('Pottery and Porcelain of United States') divides pre-Columbian pottery into three groups, (1) the crude work of the eastern coast; (2) the better wares of the mound builders, and (3) the superior productions of the more civilized tribes of the west.

The eastern tribes were scarcely more than savages, even in the day of the Pilgrims. The pottery was rude in the extreme and scarcely burned. So fragile indeed that but few examples remain. The Wyoming Historical and Geological Society of Wilkesbarre, Wyoming County, Pa., have given attention to the preservation of these records, and they possess some unique specimens. Clay pipes were in common use among the Indians, and, in fact, were put in circulation as a kind of currency. Some of the Indian women even now in their reservations indulge in the pastime of pottery-making, but the manufacture has almost died out.

The pottery of the mound-builders forms an extensive study in itself. In addition to the building of plain forms considerable skill in modeling was developed. Not only were animal and bird forms produced, with more or less fidelity, but the human face, in some cases full of expression, was constantly used as a relief embellishment. Students distinguish between painted and unpainted wares, but there is divided opinion as to whether these classes were contemporaneous or divided.

Through the States of Colorado and Utah, and in the great valleys of the San Juan, the Colorado and the Rio Grande, are found numerous relics of the work of the house-building tribes. This pottery is far in advance of either of the other types. In some cases the structure of the soils is boldly asserted as a decoration, sometimes alone and often in conjunction with painting. Skill in modeling was well developed, but the work is archaic in type. Drawings of birds and beasts are frequently used in decoration and natural clays find frequent employment as colors. There is no doubt that the principles of decoration by which the contemporary basket work was embellished inspired much of the clay treatment.

Even the earliest settlers engaged more or less in clay work. Brick and tile were, naturally, their first products. See BRICK; ROOFING TILE.

The first pottery for white or cream wares was built at Burlington, N. J., about the year 1684. The abundant clays of New Jersey attracted the attention of many who had been concerned with pottery in the old country, and for nearly two hundred years the work was in close imitation of that manufactured in England. Nearly all the distinctive styles of the period were attempted. Slip painting, sgraffito, stoneware, and queensware were all pursued with more or less success, both English and German potters being at work. In some parts of the country, notably in eastern Ohio, pottery-making became a home industry. Many a barn held a "kick" wheel, and a small kiln served to finish the work. Farmers divided their time between clay and soil; and, building rough flat-boats, would float their wares down the river for sale in the large towns.

The third epoch may be described as that of the factory. The large pottery centres, East Liverpool, Ohio, and Trenton, N. J., were established about the beginning of the period. It may also be characterized as the era of bad quality. The potters were new to the local materials. Clays were carelessly mined and badly prepared, and in many cases the men who attempted to make pottery were ignorant of anything but the processes of manipulation. It is not strange, therefore, to find that the work of this period was very inferior, nor to learn that those who made it were inordinately vain of their productions. Every now and then some enterprising manufacturer would attempt an important piece of work, but the results were uniformly disastrous. There is almost nothing to show for the work of these years but a series of misdirected efforts.

The cause of the renaissance which, happily for the country, at length dawned, was the Centennial Exhibition of 1876. There, for the first time, non-traveling Americans were brought face to face with the productions of Europe, and the contrast with American work was very marked. The effect of the lesson was not immediate. Some manufacturers declined to be aroused, they were making money under a high protective tariff and were content to produce inferior wares. Those upon whom the influence was strongest were private individuals, painters, sculptors, and amateurs. A company of women got together and eventually established the Rookwood Pottery. (See ROOKWOOD.) On somewhat similar lines several small manufactories of glazed pottery have since been opened, among which are the Grueby faience, Boston; the Merrimac pottery, Newburyport, Mass.; Lonhuda ware, Steubenville, Ohio; Lonelsa ware, Zanesville, Ohio. During this period a number of English decorators sought employment in this country. They were somewhat stereotyped in style and secured short engagements in factory after factory. A few pieces were produced at each, and for some reason the output ceased. A number of similar works are therefore extant. They have been made in many places of differently composed wares, but all are decorated by the same band of artists. The identification of such wares becomes very difficult therefore, but they remain as an evidence of a desire on the part of the manufacturers for a higher grade of work.

The pottery centres of East Liverpool, Ohio, and Trenton, N. J., have grown into large and prosperous communities. A number of English workmen have settled in each place, and the English accent and English sports flourish. In each city there are upward of 40 establishments directly engaged in producing ceramic wares and the accessories thereto.

The types of ware included in the term pottery range themselves according to color, structure, use, and locality. Thus Rockingham, yellow ware, and cream color, abbreviated to C. C., are definitions arising from color. Granite, ironstone, opaque china, and hotel china, are judged by structure, a fine vitreous body; the term "use" defines sanitary and railroad ware, mortars and chemical stoneware, while locality gives names to Belleek, Rookwood, and other fancy wares.

C. C. ware is the lineal descendant of English earthenware; the materials used are similar (see POTTERY), but a higher temperature is uniformly employed in America. The term is no longer accurate. The cream color was due to the natural tint of the clays of which even the best contain a small percentage of iron, but the exigencies of trade have forced the potters to neutralize this by the addition of a blue stain. C. C. therefore can no longer be distinguished by its color.

Rockingham and yellow wares are virtually the same wherever made. Common buff-burning clays are used, and in the former ware the glaze is stained dark-brown by the use of manganese; in the latter a cheap lead glaze over the yellowish clay intensifies the color. Jet ware is usually made from a red clay covered with a blue glaze.

In the production of sanitary ware America holds the field. Great demands have been made upon the potters on account of increased domestic comforts and the elaboration of railroad fittings. The earthenware necessaries of kitchen and bathroom have been brought to great perfection, both in composition of body and glaze and in methods of manufacture. See ENAMELED POTTERY.

No factory of any repute is without a complete plumber's apparatus by which every piece is tested for its action with water before being shipped.

Hotel china has also been brought to a highly satisfactory point. The demand of hotels and restaurants for a tough ware led a number of manufacturers into the experimental field. Costly as was the process, one after another has come forth successful. The conclusion to which all have arrived is that high temperature is the secret of success. The mixture of materials must of course be adjusted to suit the extreme heat, and there is no doubt that tons of pottery have been destroyed before the correct proportions were found. This ware is a distinctive American product. It can be matched against any pottery in the world of its own class without risk of failure. It has little or no pretence to artistic merit, for the decorations are, for the most part, inexpensive, but for withstanding the knocks of a strenuous life there is nothing so good. The principal factories making this ware are the Greenwood Pottery, the Lamberton Works, and the Crescent Pottery, of Trenton; the Knowles, Taylor & Knowles Company, of East Liverpool, Ohio; and the Onondaga Pottery, of Syracuse, N. Y.

Belleek ware had its origin in the town of that name in Fermanagh, Ireland, and the first ware made in America of this type was compounded by men who had worked in the old country, and was avowedly an imitation of the Irish product. It, however, speedily assumed a character of its own and was pursued on entirely different lines. The ware belongs to the class of soft porcelain. It is light, translucent and of a pale creamy color. The body is largely composed of feldspar, which is mined in Maine and Connecticut in great abundance. The glaze is a fusible compound in which lead oxide is largely present. This porcelain is greatly in demand for over-glaze painting. The soft glaze enables almost any ceramic color to be melted to a brilliant surface in any of the ordinary studio kilns. The best Belleek is made by the Ceramic Art Company and the Willetts Manufacturing Company, of Trenton, N. J.

An account of American ceramics would not be complete without a word on the enthusiasm for china-painting and clay-working which has possessed American women for the last two decades. The movement took serious shape soon after the Centennial Exposition, and may be said to have reached its height in 1893. In that year at the World's Fair a great quantity of so-called "amateur painting" was exhibited, and some of it was severely criticised. The criticism was taken to heart and from that time the work greatly improved. Study-clubs were formed and more serious work undertaken, culminating, in a number of instances, in women undertaking to produce their wares from the clay, instead of being content to paint upon purchased pieces. This movement is yet in its infancy and must eventually exercise a large influence upon the quality of American clay-work.

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Ceramic (sẹ- or kẹ-răm'ĭk) **Society, The American,** a body of scientific clay-workers organized in 1899. The 'Transactions' of the Society already form the most complete record of progress in ceramic knowledge published in the English language.

Cerar'gyrite, native chloride of silver, AgCl. It crystallizes in the isometric system, and is cubical in general habit. It has a specific gravity of 5.55, and is quite soft, with a grayish color and a resinous lustre. Upon exposure to light its color changes to a violet-brown. It occurs in Mexico, in western South America, in Norway, and in the Ural Mountains. In the United States it is found in Idaho, Utah, Colorado, Nevada, and Arizona. When found in quantity it is valuable as an ore of silver.

Cerastes, a genus of African vipers, remarkable for their fatal venom, and for two little horns formed by the scales above the eyes. Hence they have received the name of horned vipers. The tail is very distinct from the body. *C. cornutus* is the horned viper of northern Africa, a species known to the ancients. There are several other species.

Cerasus, a genus of trees, the cherries, of the order *Rosaceæ,* now always regarded as a section of the genus *Prunus,* distinguished from the other sections by the smooth, bloomless fruit, conduplicate vernation, and other characters. See CHERRY.

Cerates, official preparations of the United States Pharmacopœia. They are unctous substances, consisting of oil or lard mixed with wax, spermaceti, or resin, to which various medicines may be added. In consistency they are harder than ointments and softer than plasters, and should be capable of being spread at ordinary temperatures on cloth, and should not melt at the temperature of the human body.

Ceratodus, sĕr'ạ-tō-dŭs, a genus of fishes belonging to the *Dipnoi* or lung-fishes. It is the barramunda or native salmon of the Australian rivers, measures from three to six feet in length, and forms an interesting connecting link between the oldest surviving group of fishes and the lowest air-breathing animals. It is said to leave the water and go on the flats after vegetable food, but its traveling powers cannot be great.

Cerato'sa, certain sponges in which the skeleton or solid support is horny. Another name is *Ceratospongiæ.* The skeleton consists of spongin, which differs chemically from the substance of true horn (keratin). The spongin is deposited in long fibres by peculiar cells (spongioblasts). The fibres interlace, branch, and unite into the supporting framework of the sponge. Examples of the horny or fibrous sponges are the bath-sponges, such as *Euspongia officinalis,* varieties of which occur in the Medi-

terranean and about the West Indies, Florida, etc. See SPONGE.

Ceratosaurus, sĕ-ra-tō-sôr'ŭs, a carnivorous dinosaur (see DINOSAURIA) resembling Allosaurus (q.v.), but of smaller size and with small horns over the eyes and on the nasal bones. It is found in the Como formation of Wyoming (Upper Jurassic Period).

Ceraunian (sē-râ'nĭ-an) **Mountains,** in classical geography, (1) a mountain range in the southeastern part of the Caucasus Mountains, the exact position of which is not known; (2) a chain of mountains in Epirus, northern Greece, extending to the Adriatic and forming the peninsula Acroceraunium (q.v.). The mountains themselves are also called Acroceraunia.

Cerberus, sĕr'bĕ-rŭs, in Greek myths, a three-headed dog, with snakes for hair. Hesiod describes him as fifty-headed, and states him to have been the offspring of Echidna by Typhon, the most terrible of the giants that attempted to storm heaven; but later writers give him only three heads. At his bark hell trembled, and when loosed from his hundred chains, even the Furies could not tame him. He watched the entrance of Tartarus, or the regions of the dead, and fawned on those who entered, but seized and devoured those who attempted to return. He was subdued by Heracles (Hercules).

Cercaria, sĕr-kā'rĭ-a, the so-called "nurse" of the fluke-worm (q.v.) and other trematode parasites. The body is tadpole-like in shape, with an anterior and posterior sucker, a mouth and pharynx, and a forked intestine. The *Cercariæ* are developed in the body of the parent-nurse (*redia*). Escaping from the redia, the cercaria, swimming about in pools or ponds, forces its way into the body of some snail, which forms its first host. Then, losing the tail, it becomes encysted, attached to blades of grass or herbage. The transference of the larval fluke to its final host, the sheep, is effected if the latter swallow the grass on which the cercaria has become encysted. The young fluke then escapes from the cyst, and forces its way up the bile-ducts to the liver, in which it rapidly grows, and developing reproductive organs, attains the adult condition. See TREMATODA.

Cercelée, sĕr-sē-lā, or **Recercelée,** in heraldry, applied to a cross, the ends of which are curled or twisted, like a ram's horn.

Cercis, sĕr'sĭs, a genus of plants of the order *Leguminosæ*. *C. canadensis,* redbud, or Judas-tree, is a small ornamental tree, often cultivated, but growing wild from New York south to Florida and west to Minnesota, Kansas, and Louisiana. *C. siliquastrum,* a native of the south of Europe, and of several countries in Asia, is a handsome, low tree with a spreading head. The leaves are remarkable for their unusual shape; they are of a pale, bluish-green color on the upper side, and sea-green on the under. The flowers, which have an agreeable acid taste, are often mixed in salads, and the flower-buds are pickled. The genus received the name of the Judas-tree from the tradition that it was upon a specimen of it, near Jerusalem, that Judas hanged himself.

Cercopithecidæ, sĕr-kō-pĭ-thē'sĭ-dē, a family of primates, including all the Old World monkeys, except the anthropoid apes. The various groups and species may be found described under their names. See also MONKEY.

Cer'cyon, a famous robber, killed by Theseus.

Cerdic, kĕr'dĭk, king of the West Saxons: d. 534. He was a Saxon earldorman who invaded England in 495, and after gradually fighting his way and extending his conquests, established the kingdom of Wessex about 519. He won a great battle at Charford in 519, but suffered a severe defeat from the Britons in 520 at Mount Badon, or Badbury, in Dorsetshire. In 530 he conquered the Isle of Wight. At his death his kingdom extended over the present counties of Berkshire, Wiltshire, Dorsetshire, and Hampshire (including the Isle of Wight).

Cerdo'nians, an ancient sect, whose belief, half philosophical, half religious, was a confused mixture of Christian dogmas with Oriental dualism and Gnostic ideas. Their founder, Cerdo, was a Syrian, who came to Rome about the year 139 under the pontificate of Hyginus. He maintained the existence of the Zoroastrian two principles, one of good and the other of evil. The latter, according to him, was the creator of the world and the God and lawgiver of the Jews. The former was the creator of Jesus Christ, whose incarnation, sufferings, and death were only sensible appearances, and not vital facts. His disciples became confounded with those of Marcion, who some years later propagated similar opinions.

Céré, Jean Nicolas, zhŏn nĭk-ō-lä sā-rā, French botanist: b. Isle of France 1737; d. there 2 May 1810. Under the direction of the French government he greatly extended the culture of spices in the Isle of France (now Mauritius), when that island was a French dependency. The agricultural society of Paris published his essay on the culture of rice, and awarded him a medal; and Napoleon confirmed him in his position as director of the botanical garden of the Isle of France, and conferred on him a pension of $120. A tree of the island has been called after him, Cerea.

Cere, sēr, the naked skin or fleshy sheath that covers the base of the upper mandible in some birds, through which it is supposed that a tactile sense is exercised.

Cerealia, sē-rē-ā'lĭ-a (from Ceres, the goddess of the fields and of fruits) signified the productions of agriculture, also the festivals of Ceres, celebrated at Rome. The time at which they were celebrated is not known. According to some it was the ides (13th) of April; according to others the 7th of the same month.

Ce'reals, a term derived from Ceres, the goddess of corn. Though sometimes extended to leguminous plants, as beans, lentils, etc., it is more usually and properly confined to the *Gramineæ,* as wheat, barley, rye, and oats, which are used as human food. In agriculture they are usually considered as exhausting crops, partly on account of their trailing roots; their mode of nutrition, which is effected more by the roots than by the leaves; their slender stems, which allow weeds to grow up and rob the soil; and from the necessity of allowing them to attain full maturity before they are reaped.

Accordingly it is considered one of the rules of good husbandry not to take two cereal or white crops in succession, but to make them alternate with root crops, which, growing in rows at some distance apart from each other, have the additional advantage of allowing weeds to be destroyed by means of repeated hoeings.

Cereals, or **Cereal Plants,** the grasses cultivated for their seeds which are used as food by man and animals. Sometimes also called bread-plants and, in Europe, corn-plants. The principal ones are treated in separate articles. See BARLEY; MAIZE; MILLET; OATS; RICE; RYE; SORGHUM; WHEAT.

Cerebellum, sĕr-e-bĕl'ŭm ("the little brain") that portion of the brain situated behind and beneath the cerebrum. It is connected with the main brain mass by means of two feet or stems, the cerebellar peduncles, and is separated from the main brain mass in the cranial cavity by a thick layer of connective tissue, the tentorium cerebelli. It is also connected with the pons by a pair of middle peduncles, and with the medulla oblongata by the inferior peduncles. It thus forms a very integral portion of the brain mass. In general the form of the cerebellum in human beings is a flattened ovoid measuring from eight to ten centimeters from side to side, five to six centimeters from before backward, and five centimeters vertically. Its average weight is about 140 grams, which is one eighth of the weight of the whole cerebro-spinal axis. It is larger and heavier in the male than in the female, and is relatively larger in the adult than in the child. Like the brain, it is divided up into a number of lobes, of which three are most prominent, the middle portion, or vermis, and the two lateral lobes. The minute structure of the cerebellum is somewhat similar to that of the cerebrum, but there are certainly very marked differences, particularly in the development of a layer of very characteristic cells, the Purkinje cells. The interior of the cerebellum contains masses of gray matter, or nuclei. These are the dentate nucleus, the nucleus emboliformis, nucleus globosus, and the nucleus fastigii in the vermis. Through the inferior, middle, and superior peduncles fibres pass to and from the cerebrum, pons, medulla, and spinal cord, thus bringing the cerebellum into organic union with the rest of the nervous system. The functions of the cerebellum are not yet completely known, but it is certain that the cerebellum has a number of important functions, chief among which are those connected with locomotion and the act of balancing. Affections of the cerebellum often result in a peculiar form of staggering, known as cerebellar ataxia. See BRAIN.

Cer'ebral Hemorrhage. See BRAIN, DISEASES OF.

Cerebra'tion, an old term, much used in the early physiologies, designating an automatic reflex series of brain actions taking place below the threshhold of consciousness. See CONSCIOUSNESS.

Cer'ebrin, sĕr'e-brĭn, a name that has been applied, at different times and by different chemists, to various substances that are obtainable from the brain and other parts of the nervous system by extraction with alcohol. It is now usually applied to a white, crystalline, nitrogenous powder that is obtained by heating ox-brain with baryta, washing, drying, and finally extracting with alcohol. The cholesterin that is also present in the product so obtained may be removed by the action of ether, in which cerebrin is insoluble. Cerebrin does not combine with acids or bases, but by prolonged boiling with hydrochloric acid it is converted into a substance that can reduce Fehling's solution.

Cer'ebro-spi'nal, pertaining to the brain and spinal cord together, looked on as forming one nerve mass.

Cerebro-spinal Fluid. See BRAIN.

Cerebro-spinal Meningitis. See MENINGITIS.

Cerebrum. See BRAIN.

Ceremo'nial of the European Powers, certain forms of international etiquette or usage, which have arisen in Europe during modern times. No independent state can actually have precedence of another; but as the weaker seek the protection and friendship of the more powerful, there arises a priority of rank. This has occasioned the gradual establishment of dignities, rank, and acts of respect to states, their rulers, and representatives, by which means (in contradistinction to the internal etiquette of a state) an international ceremonial has been formed, which has been the source of confusion and war, and to the observance of which far more consideration is often paid than to the fulfilment of the most sacred contracts. Louis XIV. carried this folly further, perhaps, than any one before or after him. To this international ceremonial belong:

1. Titles of rulers. Accident made the imperial and regal titles the highest, and thus conferred advantages apart from the power of the princes. After Charlemagne, the emperors of the Romans were considered as the sovereigns of Christendom, maintained the highest rank, and even asserted the dependence of the kings on themselves. For this reason several kings in the Middle Ages, to demonstrate their independence, likewise gave their crowns the title of "imperial." England, for example, in all its public acts, is still styled the "imperial crown." The kings of France received from the Turks and Africans a title equivalent to emperor of France. In progress of time the kings were less willing to concede to the imperial title, of itself, superiority to the royal.

2. Acknowledgment of the titles and rank of rulers. Formerly the Popes and emperors arrogated the right of granting these dignities; but the principle was afterward established, that every people could grant to its rulers at pleasure a title, the recognition of which rests on the pleasure of other powers, and on treaties. Some titles were therefore never recognized, or not till after the lapse of considerable time. This was the case with the royal title of Prussia, the imperial title of Russia, the new titles of German princes, etc.

3. Marks of respect conformable to the rank and titles of sovereigns. To the "royal" prerogatives, so called (conceded, however, to various states which were neither kingdoms nor empires, such as Venice, the Netherlands, Switzerland, and the electorates), pertained the right of sending ambassadors of the first class, etc. In connection with this there is a much contested

point, namely, that of precedence or priority of rank, that is of the right of assuming the more honorable station on any occasion, either personally, at meetings of the princes themselves, or of their ambassadors, at formal assemblies, etc., or by writing, as in the form and signature of state papers. There is never a want of grounds for supporting a claim to precedence.

As the councils in the Middle Ages afforded the most frequent occasion of such controversies, the Popes often intervened. Of the several arrangements of the rank of the European powers which emanated from the Popes, the principal is the one promulgated in 1504 by Julius II., through his master of ceremonies, in which the European nations followed in this order: (1) the emperor of the Romans (emperor of Germany); (2) the king of Rome; (3) the king of France; (4) the king of Spain; (5) of Aragon; (6) of Portugal; (7) of England; (8) of Sicily; (9) of Scotland; (10) of Hungary; (11) of Navarre; (12) of Cyprus; (13) of Bohemia; (14) of Poland; (15) of Denmark; (16) Republic of Venice; (17) Duke of Bretagne; (18) Duke of Burgundy; (19) Elector of Bavaria; (20) of Saxony; (21) of Brandenburg; (22) Archduke of Austria; (23) Duke of Savoy; (24) Grand-Duke of Florence; (25) Duke of Milan; (26) Duke of Bavaria; (27) of Lorraine. This order of rank was not, indeed, universally received, but it contained a fruitful germ of future quarrels; some states, which were benefited by the arrangement, insisting upon its adoption, and others, from opposite reasons, refusing to acknowledge it. To support their claims for precedence the candidates sometimes relied on the length of time which had elapsed since their families became independent, or since the introduction of Christianity into their dominions; sometimes on the form of government, the number of crowns, the titles, achievements, extent of possessions, etc., pertaining to each. But no definite rules have been established by which states are designated as being of the first, second, third, fourth, etc., rank. Rulers of equal dignity, when they make visits, concede to each other the precedence at home; in other cases, where the precedence is not settled, they or their ambassadors take turns till a compromise is effected in some way. In Great Britain and France far less ceremonial is observed, in the official style, than in Germany, where forms and titles are carried to an absurd extent, and the ceremonial words, which extend even to the pronouns by which the princes are designated, it is not possible to translate. Emperors and kings mutually style each other "brother," while they call princes of less degree "cousin." The German emperors formerly used the term "thou" in addressing other princes. The "we," by which monarchs style themselves, is used either from an assumption of state or from a feeling of modesty, on the supposition that "I" would sound despotical, while "we" seems to include the whole administration, etc.

Cereopsis, sē-rē-ŏp'sĭs, the pigeon-goose, an Australian genus of the *Anatidæ* or duck family, and the subfamily *Anserinæ,* or geese. *C. novæ hollandiæ* is abundant on the south coast of Australia and the adjacent islands.

Ceres, sē'rēz, the name given by the Romans to the Greek goddess of agriculture, Demeter, when her worship was introduced into Rome. The origin of the name cannot be explained with certainty. It is not Latin; but some think that it was Etruscan, among whom, according to Servius, Ceres was one of the Penates. Others think that Ceres may be the same with the Greek Cora, or Core (that is, "maiden"), another name for Persephone, the daughter of Demeter, with whom Demeter herself was often confounded. The worship of Demeter, or Ceres, was introduced into Rome from Sicily at the beginning of the 5th century B.C., and the first temple to her was vowed by the dictator, A. Postumius Albinus, 496 B.C. Her worship soon acquired a considerable degree of political importance. As usual when the Romans introduced the worship of a foreign divinity into their own city, they adopted all the legends connected with that divinity, adapting them to their own mythology. Thus, since Demeter was said by the Greeks to be the daughter of Kronos and Rhea, and accordingly sister of Hera, Aïdes (or Hades), Poseidōn, Zeus, and Hestia, so Ceres was regarded by the Romans as the daughter of Saturn and Ops, and sister of Juno, Pluto, Neptune, Jupiter, and Vesta; and so also the Persephone of the Greeks became the Proserpine of the Romans. See DEMETER.

Ceres, the name of the first asteroid discovered. It was discovered by Piazzi 1 Jan. 1801. Having observed it at Palermo, in Sicily, he called it Ceres, after the old tutelary divinity of that island. Under favorable circumstances it has been seen by the naked eye as a star of the seventh magnitude, but more generally it looks like one of the eighth magnitude, only the light has a red tinge, and a haze surrounds the planet as if it had a dense atmosphere.

Cereus, sē'rē-us, a genus of plants of the order *Cactaceæ,* remarkable for their singularity of form and the beauty of the flowers. *C. giganteus,* the Suwarrow or Saguaro of the Mexicans, is the largest and most striking of the genus. It rises to the height of 50 or 60 feet, and looks more like a candelabrum than a tree of the normal type. Other notable species are *C. senilis,* the long gray bristles of which give it the appearance of the head of an old gray-haired man. *C. grandiflorus* is the night-flowering cereus, but there are others which also flower at night. *C. speciosissimus,* an erect plant, commonly cultivated in greenhouses, is a native of Mexico. *C. flagelliformis,* a creeper, is not unfrequently met with in gardens. The members of the genus are generally useful as cardiac agents and antipyretics,—particularly the Mexican fever-few, *C. Bonplandi.*

Cerignola, chā-rēn-yō'lä, Italy, a town in the province of Foggia, and 24 miles southeast from the city of Foggia. It has a college, several convents, and a hospital. The inhabitants manufacture linen; and the district produces large quantities of almonds and cotton. In 1503 the Spaniards, under Gonzales, Duke of Cordova, here defeated the French, when the Duke de Nemours, who commanded the latter, was slain. Pop. 34,000.

Cerigo, chā'rē gō (ancient CYTHERA), an island in the Mediterranean, separated from the southern coast of the Morea by a narrow strait. It formerly belonged to the Ionian Republic of the Seven Islands, but since 1864 has been part

of the kingdom of Greece; area about 106 square miles. Cerigo, with the neighboring islands, now forms one of the eparchies belonging to the province or nome of Argolis and Korinthia. It is rather rocky and mountainous. Grain, wine, olives, and other fruits are raised. Sheep and goats constitute the chief live stock. The people are of Greek origin, and are all of the Greek Church. At an early period a Phœnician colony was founded here. Later it was successively under the control of Argos, Sparta, and Athens, and finally fell into the hands of the Romans. After submitting to Venice and then to Turkey, in 1718, it was once more assigned to Venice. It was annexed to France in 1807; two years later it was occupied by the English; and since 1815 it has shared the fate of the Ionian Islands. It was anciently sacred to Aphrodite (Venus), who was also called Cytherœa. Pop. 12,306.

Cerin'thus, one of the first heresiarchs who, according to St. Irenæus in his work, 'Against Heresies,' was contemporary with the evangelist St. John; but Tertullian and Epiphanius refer him to the time of Hadrian. In Irenæus' work, as also in the 'Philosophumena,' attributed variously to Origen and Hippolytus, bishop of Ostia, Cerinthus is represented as an alumnus of the pagan philosophical schools of Alexandria; but he broached his heretical doctrines in Asia Minor, and there had a numerous following. The universe, he taught, is not the work of the First God, but was created by some angelic power far inferior to the supreme power. Jesus he held to be the son of Joseph and Mary, born as other men are born, but excelling all in righteousness, wisdom, and understanding. Cerinthus taught also that upon Jesus, after his baptism by John, descended the Christos from the power which is supreme over all, in the form of a dove, and that when Jesus proclaimed the unknown Father and wrought miracles; but that at the end of the passion the Christos flew away out of Jesus, and Jesus suffered, but that the Christos remained impassible, being the spirit (or breath) of God. Angels play a conspicuous part in the system of Cerinthus. Thus it was an angel, he says, that gave the law to Moses; and the Jahve of Israel was an angel. Cerinthus and his followers entertained a special animosity against St. Paul and St. John, and the heresiarch is credited with writing an apocalyptic book in rivalry with St. John. He is said to have been a believer in the millennial reign of the Christ upon the earth.

Ce'rite, sē'rīt, a mineral occurring only at Riddarhyttan, in Sweden, and containing the rare element cerium, and others of the cerium group. Its formula is not certainly known, but the mineral may be described as a silicate of the metals of the cerium group, combined with small quantites of calcium and iron. It is mostly massive or granular, but crystals belonging to the orthorhombic system are sometimes found. Cerite has a hardness of about 5.5, and a specific gravity of about 4.9. It has a peculiar and characteristic color, intermediate between clove-brown and cherry-red, shading off to a gray.

Cerito, Francesca, frän-chĕs'kä chā-rē'tō, commonly called FANNY, Italian danseuse: b. Naples 1823. She was the daughter of an officer who served in the Neapolitan army under Murat, and made her début at the San Carlo theatre in 1836, and, although only 13, was received with great enthusiasm. At Milan, in 1838, and for two years at the Kärntherthortheatre in Vienna, and afterward in Paris and London, everywhere the same storm of applause greeted her appearance, especially in London. She excelled most in lively, gentle, arch, and delicate gestures and attitudes, and less in heroic or classical parts. In 1850 she separated from her husband, Mr. St. Leon, who was well known in Paris and London as dancer and violinist.

Ce'rium, sē'rĭ-ŭm, a metallic element the oxide of which was discovered and recognized as a new substance in 1803 by Klaproth, and, independently, by Berzelius and Hisinger. It was named for the minor planet Ceres, which was also discovered at about the same time. The principal source of cerium is the mineral monazite (q.v.), which is a silicate of cerium and certain other allied elements. Cerium forms a basic nitrate that is insoluble in water, and this fact affords a ready means of separating the metal from the other elements with which it is almost invariably associated. Metallic cerium may be obtained by electrolysis of the anhydrous chloride, or by melting the anhydrous chloride with metallic sodium. Thus perepared, cerium is a steel-gray metal, ductile and malleable, and melting at a temperature probably not far from the melting-point of silver. Its chemical symbol is Ce, and its atomic weight is 140 if O = 16, and 139 if H = 1. It has a specific gravity of from 6.6 to 6.75, and a specific heat of about 0.0448. It does not change in dry air, but in moist air it oxidizes superficially. It decomposes cold water slowly, and hot water quickly. Two oxides of the metal certainly exist, one having the formula Ce_2O_3, and the other the formula CeO_2. Three other oxides have also been described, with the formulæ CeO_3, Ce_2O_5, and Ce_4O_9; of these the first probably exists, but the other two still need confirmation. Oxide of cerium is also used in the manufacture of the better grades of incandescent gas-mantles. A fabric of cotton is woven of the desired form, and this is impregnated by repeated dipping in a solution of the nitrates of cerium and thorium. On ignition the cotton burns away, and the nitrates are converted into oxides, which give the intense luminosity desired. A mixture of 99 per cent of thorium oxide to 1 of cerium oxide gives the best results.

In medicine the insoluble salts of cerium are used, cerium oxalate alone being officinal. It resembles the insoluble bismuth compounds in its action, being a sedative to mucous membranes, and it is much used as an antemetic, particularly in the nausea of pregnancy. The soluble salts of cerium are poisons, their action being similar to the soluble salts of bismuth.

Cernuschi, Enrico, ĕn-rē'kō chĕr-noos'kē, Italian economist: b. Milan, Italy, 1821; d. Mentone 12 May 1896. He was graduated at Pavia in 1842, fought for liberty in the insurrection of 1848, and was obliged to flee from Italy, owing to political proscription. He acquired a large fortune in Paris as a banker, but owing to the hostility of the communists left France in 1871 and traveled extensively in Egypt, China, Japan, England, and the United States, visiting the last-named in 1877. He was an ardent bimetallist, and published 'Mecanique de

l'É'change' (1865); 'Illusions des Sociétiés coöperatives' (1886); 'Discours' (1871); 'Silver Vindicated' (1876); 'Le Bi-métallism à quinze et demi' (1881); 'Anatomie de la Monnaie' (1886); etc.

Cero, sē'rō, a large, edible fish (*Scomberomorus regale*) of the western Atlantic, and similar to the Spanish mackerel. Another species (*S. caballa*), also called "sierra" or "king-cero" is found in the southern Atlantic, and reaches double the weight of the former, often attaining 100 pounds.

Ceroxylon, a genus of South American palms. See WAX-PALM.

Cerquozzi, Michelangelo, mē'kĕl än'jā-lō chär-kwôt'zē, Roman painter: b. Rome 1602; d. 1660. He received the surname *delle battaglie* (battle-painter), and at a later period that of *delle bambocciate,* because, in imitation of Peter Laar, he painted ludicrous scenes taken from low life, such as that to be seen at fairs and markets, and among the Lazzaroni. In his later years he painted flowers and fruit.

Cerretti, Luigi, loo-ē'jē chĕr-rĕt'tē, Italian poet and rhetorician; b. Modena 1 Nov. 1738; d. Pavia 5 March 1808. The purity and elegance of his diction made him, at an early age, the most distinguished professor of rhetoric and oratory in Italy. His 'Poems and Select Prose,' collected into a posthumous volume, were instantly successful, and have retained their rank ever since.

Cerro Blanco, the highest mountain in New Mexico; summit, 14,269 feet.

Cerro Gordo, thĕr rō gôr'dō, or sĕr'rō gôr'dō ("Big Hill"), a famous mountain pass in Mexico, the scene on 18 April 1847, of one of the sharpest battles of the Mexican war. After the capture of Vera Cruz on the coast, Gen. Scott moved northwest toward the City of Mexico, along the National Road. Some 50 miles from Vera Cruz this leaves the steaming lowlands and climbs a steep rocky plateau, an eastern spur of the great mountain range, seamed with ravines and thick with chaparral, and pierced by the defile of the little Rio del Plan. To this defile the road after crossing it and leaving it by a loop to the north among the mountains, returns at a ravine separating a sharp rocky ridge called Atalaya from a conical eminence termed Telegraph Hill. West of this again is the small hamlet called Cerro Gordo, which gives its name to the pass. On 9 April Santa Anna began fortifying Telegraph Hill, and from the 12th pushed on the work with all his force; accumulating about 12,000 men, the bulk at Cerro Gordo, but neglecting to occupy Atalaya. On the 11th, Scott's vanguard under Twiggs and Harney came up to Rio del Plan at the foot of the plateau, where the road crosses the river, drove away a few Mexican lancers, established a camp, and began reconnaissances. Santa Anna, in place of attacking the scattered detachments, confided in his strong position, and the lowland fevers which must force the Americans to fight him, and waited. By the 17th most of Scott's forces had come up; and he pushed Twiggs forward within easy striking distance. The latter, finding Atalaya undefended occupied it just as a Mexican detachment advanced to do so, routed them, and chased them in headlong flight half way up Telegraph Hill. The whole American army, about 8,500, being now at hand, Scott issued orders for a general advance next day. Santa Anna's line extended from Telegraph Hill to a road at the ravine, and eastward for a mile along the heights overlooking the National Road, which end in a precipitous rocky bluff 100 feet high; then back over three ridges terminating in rocky knolls, to the river defile. In front of the batteries and infantry, the chaparral had been cut down and piled into an abattis for several hundred feet. The Americans, on the other hand, planted powerful batteries on Atalaya, and enfiladed the Mexican right with a howitzer across the river. Scott's plan was simple, but brilliantly effective, though the impassable ground made it fall short of the full intention. Since the Mexicans expected the chief attack on their right, he resolved to make only a feint there and assuming that they expected him to move forward along the road resolved not to do so. In the meantime he ordered the roads cleared around the hills to the north in order that by making a circuit to the National Road in the rear of the Mexicans he might cut off their retreat. On the morning of the 18th Pillow assailed the right; the artillery on Atalaya rained shot and shell with terrific effect on Telegraph Hill, the road batteries, Santa Anna's camp, and even his reserves, and the howitzer over the river added its discharge. Twiggs, Shields, and Worth, with Riley, then moved along the circuit till on the north flank of Telegraph Hill, at first out of sight, then in full range of the Mexican fire. Santa Anna detached part of the forces on Telegraph Hill to drive them back; then Harney from Atalaya swept over the crest and down the side, up Telegraph Hill till within 200 feet of the batteries and below their range. There he reformed and in one final charge utterly routed the Mexicans, at the same time turning the forces on the hill against the main body of Mexicans at Cerro Gordo. The entire right, its retreat cut off, threw down its arms and surrendered. The main body broke up in a panic as the fugitives from Telegraph Hill rushed among them and the guns from that quarter cut them down and fled wildly down the craggy slopes and to the defile, and westward along the road. The Mexicans lost 1,000 or 1,200 in killed and wounded; about 3,000 prisoners, including five generals, and 299 other officers; 43 guns, and 3,500 small arms. The Americans lost 63 killed and 368 wounded. The victory laid open the road nearly to the Mexican capital.

Cerro de Pasco, sĕr'rō dā päs'kō, Peru, capital city of the department of Junin, at the northern extremity of the plateau of Bourbon, 14,275 feet above the level of the sea. The town came into existence in 1630, in consequence of the discovery of veins of silver there by an Indian. The streets are narrow and crooked, and the houses small and without windows or balconies. The inhabitants are a mixture of all races and nations, who make their living by the produce of the mines. From October to July hail-storms, mists, and snow-falls make the place almost intolerable, and in summer with the exception of a few clear days the climate is little better. On account of the extreme rarity of the air the difference in temperature

ir the sun and in the shade is great. Cerro de Pasco still contains the most productive mines in all Peru, although they no longer yield the almost fabulous wealth that the Spaniards are said to have derived from them. Many of the shafts leading down to the veins of silver are in the town itself, and have their openings either in little huts or in the dwellings of the owners of the mines. According to the greater or smaller depth of the diggings they are called *minas* or *cortes*. The silver is found partly pure, and partly in ores containing from 25 to 80 per cent of the precious metal. Pop. (very variable) about 7,000.

Cerro Gordo de Potosi, da pō-tō-sē', a mountain in the Andes of Bolivia; southwest of Potosi, 16,150 feet high. It is remarkable for its deposits of silver.

Cerro Largo, sĕr'rō lär'gō, a department in the northeast of Uruguay, well watered, with large savannahs and forests. Area, 5,729 square miles. Capital, Cerro Largo or Melo. The inhabitants are chiefly engaged in cattle-raising. Pop. 36,000.

Cerros, or **Cedros Island,** an island belonging to Mexico, in the Pacific Ocean, off the west coast of Lower California. It is for the most part mountainous and barren, but is thought to possess mineral wealth. Area, 12 square miles.

Certaldo, Italy, a town of Tuscany, partly on a conical height, and partly on a flat along the right bank of the Elsa, 15 miles southwest from Florence. It is the birthplace, was long the home, and now contains the ashes of Boccaccio. His house is still shown, and in one of its rooms are collected numerous relics of tho author of the 'Decameron,' and a large fresco painting of him by Benvenuti of Florence.

Certiorari, sėr-tē-ō-rā-rī, or sėr-shē-ō-rār'ī, in law, a writ, the purport of which is to remove convictions, orders, or proceedings before magistrates, indictments, and records in civil actions before judgment, from inferior courts into the courts above, with a view that the party may have justice done to him, or that the superior court may see whether the justices or court below, before which the proceedings have taken place previously to the certiorari being obtained, have kept within the limits of their jurisdiction. This writ, from the moment of its delivery to the judges of the court below, or magistrate, suspends their power, and any subsequent proceedings by them are void and *coram non judice*. Although the writ of certiorari removes the record from the inferior court into the court above, yet the court above does not take up the cause where the proceedings stopped, but begins *de novo*. Procedure by appeal has largely superseded that by certiorari.

Ceruleum, a blue pigment, consisting of stannate of protoxide of cobalt mixed with stannic acid and sulphate of lime.

Ceru'minous Glands, the glands of the ear which secrete the cerumen or wax which lubricates the passage to the tympanum and prevents the entrance of foreign matter.

Cerussite, the native lead carbonate, $PbCO_3$. It is common in orthorhombic crystals, very frequently stellately twinned. It also abounds in massive, earthy and stalactitic forms. It is very brittle, has a hardness of 3. to 3.5 and the high specific gravity of 6.5. It is usually translucent and of an adamantine or pearly lustre. Its color is white or gray, though green and yellow tints are not uncommon. It is one of the most abundant and valuable ores of lead, and often carries silver. It is formed from galena by the action of solutions of calcium bicarbonate. Among its many important localities are Broken Hill in New South Wales, Ems in Germany, and Phœnixville, Pa.

Cerutti, Giuseppe Antonio Gioachimo, joo-sĕp'pĕ än-tō'nē-ō jō-ä-kē'mō chä-roo'tē, Italian Jesuit theologian: b. Turin 13 June 1738; d. Paris, February 1792. He was one of the most eminent professors in the Jesuit College at Lyons and his 'Apology for the Jesuits' attracted much attention. He had already published two discourses upon the means of preventing duels, and on the reasons why modern republics have not reached the splendor of the ancient. The last received the prize of the Academy of Dijon. He was at Paris when the Revolution broke out in 1789. Abandoning his former principles he became one of the most zealous supporters of the new order of things. He was intimately connected with Mirabeau, and labored much for him. He also published several pamphlets, among which was a 'Mémoire sur la Nécessité des Contributions Patriotiques.' In 1791 he was a member of the legislative assembly. Some time after he delivered, in the Church of St. Eustache, a funeral discourse upon Mirabeau. The city of Paris called a street after his name.

Cervantes Saavedra, Miguel de, mē-gĕl' dā thär-bän'tēs sä-ä-bā drä, Spanish poet and novelist, one of the great writers of modern times: b. Alcala de Henares 9 Oct. 1547; d. Madrid 23 April 1616. His parents removed to Madrid when he was about seven years old. Their limited means made it desirable that he should fix on some professional study, but he followed his irresistible inclination to poetry, which his teacher, Juan Lopez, encouraged. Elegies, ballads, sonnets, and a pastoral, Filena, were the first productions of his poetical genius. Poverty compelled him to quit his country at the age of 22, to seek maintenance elsewhere; he went to Italy, where he became page to the Cardinal Giulio Acquaviva, in Rome. In 1570 he served under the papal commander, Marco Antonio Colonna, in the war against the Turks and African corsairs, with distinguished courage. In the battle of Lepanto, in 1571, he lost his left hand. After this he joined the troops at Naples, in the service of the Spanish king. In 1575, while returning to his country, he was taken by the corsair Arnaut Mami, and sold in Algiers as a slave. He remained in slavery for seven years, but servitude, far from subduing his mind, served to strengthen his faculties. Vincente de los Rios and M. F. Navarrete, his chief biographers, relate the bold but unsuccessful plans which he formed to obtain his freedom. In 1580 his friends and relations at length ransomed him. At the beginning of the following year he arrived in Spain, and from this time lived in seclusion, entirely devoted to the muses. It was natural to expect something uncommon from a man who, with inexhaustible invention, great richness of imagination, keen wit, and

a happy humor, united a mature, penetrating, and clear intellect, and great knowledge of real life and mankind in general. But it rarely happens that expectation is so much surpassed as was the case with Cervantes. He began his new poetical career with the pastoral novel 'Galatea' (1584), in which he celebrated his mistress. Soon after the publication of this he married. Being thus obliged to look out for more lucrative labor he employed his poetical genius for the stage; and in the course of 10 years furnished about 30 dramas, among which his tragedy called 'Numancia' is particularly valued. He was not so successful in another kind of drama particularly favored by the Spaniards, a tangled mixture of intrigues and adventures; and this was doubtless the cause of his being supplanted by Lope de Vega, who was particularly qualified for this kind of composition. He consequently gave up the theatre, but it seems not without regret. From 1588 to 1599 he lived retired at Seville, where he held a small office. He did not appear again as an author till 1605, when he produced the first portion of that work which has immortalized his name,— 'Don Quixote.' Cervantes had in view by this work to reform the taste and opinions of his countrymen. He wished to ridicule that adventurous heroism with all its evil consequences, the source of which was the innumerable novels on knight-errantry. The beginning of the work was at first coldly received, but soon met with the greatest applause, in which, at a later period, the whole of Europe joined. Cervantes' true poetical genius was nowhere so powerfully displayed as in his 'Don Quixote,' which, notwithstanding its prosaic purpose and it satirical aim, is full of genuine poetry. While it struggles against the prevailing false romance of the time, it displays the most truly romantic spirit. The extraordinary good fortune of the work did not extend to the author. All his attempts to better his condition were unsuccessful, and he lived contented with his genius and his poverty, and a modest though proud estimation of his merits. After an interval of some years, he again appeared before the public in 1613, with 'Twelve Novels' (which may be placed by the side of Boccaccio's), and in 1614 his 'Journey to Parnassus' — an attempt to improve the taste of his nation. In 1615 he published eight new dramas, with intermezzos, which, however, were indifferently received. Envy and ill-will, in the meantime, assailed him, and endeavored to deprive the neglected author of his literary fame; for which the delay of the continuation of 'Don Quixote' afforded the pretext. An unknown writer published, under the name of Alonzo Fernandez de Avellaneda, a continuation of this work, full of abuse of Cervantes. He felt the malice of the act painfully, but revenged himself in a noble manner by producing the continuation of his 'Don Quixote' (1615), the last of his works which appeared during his lifetime; for his novel 'Persiles and Sigismunda' was published after his death. He found a faithful friend in the Count of Lenos, but poverty, his constant companion through life, remained true to him till his last moments. He died on the same day as Shakespeare, in Madrid, where he had resided during the last years of his life. He was buried without any ceremony, and not even a common tombstone marks the spot where he rests. In addition to his celebrity as an author, he left the reputation of a man of a firm and noble character, clear-sighted to his own faults and those of others. Among the best editions of 'Don Quixote' are the one published at Madrid by Joaquin Ibarra, in 1780, considered a masterpiece of typography; that of Pellicer (Madrid 1798), and that of D. Diego Clemencin, with an excellent commentary (Madrid 1833–9). Many of his works are translated; 'Don Quixote' into all the languages of Europe. Among the English translations may be mentioned those of Motteux (1719); Jarvis (1742); and Smollett (1755). Several noteworthy English translations have been made in recent years: by Duffield (1881); Ormsby (1885); and Watts, (1888–9), containing life of the author, notes, bibliography, etc.

Cervantes, Philippines, capital of the province of Lepanto, situated near the centre of the province in the northwestern part of the island of Luzon, 3 miles from Cayán, the former capital. It is on a road connecting it with Benguet, and is 78 miles from Dagupan, which is the nearest point on the railroad. Pop. 16,000.

Cervantite, or **Antimony Ocher,** is native antimony tetroxide, Sb_2O_4. It usually occurs in crusting stibnite and other antimony ores. It has a pale yellow color and greasy lustre.

Cervera y Topete, Pascual, päs'kwäl thār-bā'rä ē tō-pā'tā, Spanish naval officer: b. province of Jerez 18 Feb. 1833. He was of noble birth, his mother being a daughter of Count Topete y Valle. He was graduated at the Naval Academy of San Fernando; entered on active service in 1851; and was made first lieutenant in 1859; captain in 1868; and admiral subsequently. He was a prominent factor in the 10-years' war in Cuba, when he succeeded in blockading the ports and preventing the landing of filibusters; was sent to London as a representative of Spain to take part with other nations in a conference bearing on naval questions of international importance; and commanded the fleet sent against the American squadron operating in Cuban waters after the declaration of war in 1898. He took refuge in the inner harbor of Santiago de Cuba, and when, on 3 July, he attempted to escape, under imperative orders from his superiors, his entire fleet was destroyed by the squadron under the official command of Rear-Admiral Sampson and the actual command (in the temporary absence of that officer) of Rear-Admiral Schley. Admiral Cervera and his surviving officers were sent to Annapolis, Md., as prisoners of war, and soon afterward were released and allowed to return to Spain. He is a man of cultured and genial manners, of a kindly disposition and a gallant officer, for whom his captors felt the greatest admiration and sympathy.

Cervidæ, sėr'vĭ-dē, the deer family, a group of ruminant ungulates, including, besides the typical deer, the reindeer, the musk-deer, and others. The most noticeable characteristic of the entire group is the presence, in the males, or "bucks," of branched appendages to the skull, called antlers. These are, however, lacking in certain species, which, despite this fact, are very evidently closely related to the antlered deer. The antlered animals shed these

ornaments annually and develop new ones. (For growth and reproduction of these, see ANTLERS.) All deer have a large unossified space in the fore part of the skull which prevents the lachrymal bone from coming in contact with the nasal bone, as in the ox family. In the deer without antlers the upper canine teeth are especially well developed for defensive purposes; but they are generally present in all species; and, with the exception of the musk-deer, the *Cervidæ* have no gall-bladders. Though not nearly so numerous as such families as that of the ox, the deer family includes a variety of genera and numerous species, widely distributed, so that we find representatives throughout the Old World, except in Australia and southern Africa, and in both continents of the New World. Deer are generally found in forests or grass-lands, and never in deserts. They are, historically considered, older than the other families of ruminants, dating back to the Lower Miocene Period, when they were very small and without antlers. With the gradual change in other directions, such as the variation in dentition and the increased size, the antlers have been produced and amplified, so that the deer of the present is a far larger and finer-looking animal than his fossil ancestor. In the matter of antlers the young stag typifies the evolution of the race; as a yearling, his antlers are merely one-pronged spikes; but each successive year they become more branched and forked until, at maturity they may have seven or even more branches.

All deer are supplied with a coat of short fur, dull in tone, for protection, ranging from reddish-brown to gray; and usually white below. Those that are marked bear such markings on the face and throat and on the tail. Only a few genera are spotted. In most genera only the young (the fawns) are spotted; and lose their spots when they are about one year old. Deer breed annually, the young, one or two at a birth, being produced in late spring. The fawns remain with their mothers until they are about a year old, when they are sufficiently mature to become independent. The grass-land deer, especially, are gregarious, and often gather in large herds at the approach of winter. These feed on the meadow herbage, whereas the forest deer eat the leaves, twigs, and buds of bushes. In all, about 60 species are known. They are included within the following genera: *Cervus,* the red deer; *Cervulus,* the Asiatic muntjacs; *Elaphodus,* the tufted deer; *Rangifer,* the reindeer; *Alces,* the elk; *Capreolus,* the roe-deer; *Hydropotes,* the water-deer; *Cariacus,* the American deer; *Pudua,* the Andean deer; and *Moschus,* the musk-deer. All these, except *Moschus,* form the sub-family *Cervinæ; Moschus,* by itself, forms the sub-family *Moschinæ.* See DEER, and the English names of the various species.

Cervin, Mont (German, *Matterhorn;* Italian *Monte Silvio*), a mountain, Switzerland, Pennine Alps, on the southern frontiers of canton Valais, about six miles west-southwest of Zermatt, from which a road leads to the Col St. Theodule, a pass over the mountain into Piedmont. It is one of the most magnificent objects in nature, being an almost inaccessible obelisk of rock starting up from an immense glacier, to a height scarcely 1,000 feet lower than that of Mont Blanc. The glacier, which differs from the lower glaciers in not being included between bold walls, but occupying a vast and desolate table-land, is nearly 10,000 feet above sea-level. The height of the peak is 14,837 feet. It is composed of felspar slate or gneiss. The peak was first ascended by a party of four English travelers and three guides in July 1865, but three of the party and a guide perished in the descent. (See Whymper's 'Scrambles Among the Alps'). On the summit of the pass, 11,096 feet, are the remains of a rude fortification, supposed to have been erected two or three centuries ago, to prevent incursions from the Valais.

Cervolle, or **Cervole, Armand de,** är-mäṅ dė sĕr-vŏl, French bandit chief, surnamed "The High Priest." He was taken prisoner with King John at the battle of Poitiers in 1356, and after being ransomed, plundered the south of France with a band of troopers (*routiers*), and exacted tribute from Innocent VI. at Avignon. He served for a time under the Dauphin; pillaged Burgundy, Champagne, Alsace, and Lorraine; was made Chamberlain to Charles V. in 1365; and was murdered in 1366.

Cesalpino, or **Cæsalpin, Andrea,** ān'drā-ā chā-zäl-pē'nō, Italian botanist and physiologist: b. Arezzo, Tuscany, 1519; d. Rome 23 Feb. 1603. He studied and taught medicine and botany at the University of Pisa, and was physician to Pope Clement VIII. He was the author of a valuable work 'On Plants,' in which he classified plants by their parts of fructification. To this work Linnæus, Jussieu, and other subsequent botanists were greatly indebted for their ideas of botanical classification. In his 'Peripatetic Investigations' he propounded the theory of the circulation of the blood, afterward adopted and demonstrated by Harvey.

Cesar Birotteau, sā-zär bē-rŏt-tō, **The Greatness and Decline of,** a novel by Honoré de Balzac. It portrays in a striking and accurate manner the bourgeois life of Paris at the time of the Restoration.

Cesares'co, Countess Martinengo. See MARTINENGO-CESARESCO, COUNTESS.

Cesari, Giuseppi, joo-sĕp'pē chā zā rē (sometimes called IL CAVALIERRE D'), Italian painter: b. Arpino about 1568; d. Rome 3 July 1640. He was greatly honored by no less than five Popes. His works — in fresco and oil — display lively imagination, and great tact in execution.

Cesarotti, Melchiore, mĕl-kē-ō'rē chā-zā-rōt'tē, Italian poet and scholar: b. Padua 15 May 1730; d. Solvaggiano 3 Nov. 1808. He devoted himself to the belles-lettres, and was soon chosen professor of rhetoric in the seminary in which he was educated. He translated three tragedies of Voltaire,—'Sémiramis,' 'La Mort de César,' and 'Mahomet.' In 1762 he went to Venice, where he translated Ossian into Italian, and was, in 1768, appointed professor of the Greek and Hebrew languages in the University of Padua. Here he published his translation of Demosthenes and of Homer, and his course of Greek literature. After the establishment of the republican government, in 1797, he was appointed by the existing authorities to write an 'Essay on Studies.' In this he made suggestions for the improvement of education. In

1807 appeared his poem called 'Pronea' (Providence), in praise of his benefactor, Napoleon, who made him the same year knight of the Iron Crown. In spite of his advanced age he subsequently occupied himself with an edition of all his works; but his death prevented the completion of this enterprise. The edition of his works that had been begun during his life was completed by his friend Giuseppe Barbieri (1805–13).

Cesena, chā-zā'nā, **Italy,** a city in the province of Forli, central Italy, on the right bank of the Savio. Among its buildings are a library founded in 1452 by Domenico Malatesta Novello, which possesses 4,000 precious manuscripts; a Capuchin church containing one of the best of Guercino's paintings, and a noble cathedral. Productive sulphur mines are in the neighborhood; and the region has been noted ever since Roman times for the excellence of its wine. Cesena was the birthplace of Popes Pius VI. and VII. In 1357, under Maria Ordelaffi, it made a famous defense against Albornoz; but in 1377 it was barbarously pillaged by Robert of Genf. On 30 March 1815, Murat gained a victory at this place over the Austrians. Pop. 12,000.

Cesium. See CÆSIUM.

Ce'sius, Bernar'dus, Italian philosopher: b. Modena about 1581; d. there 1630. He became a professor of philosophy and theology at Parma, and afterward at Modena, where he died of the plague. He is best known by his work entitled 'Mineralogia, sive Naturalis Philosophiæ Thesauri; Lugduni' (1636), in folio, which contains no important observations by the author himself, but is useful as being a laborious collection of everything relating to the mineralogy of the ancients, and as showing what minerals were familiarly known during the author's time.

Cesnola, Luigi Palma di, loo ē'jē päl mä dē chĕs-nō'lä, American archæologist: b. Piedmont, Italy, 29 June 1832. He served in the Italian war with Austria and came to the United States in 1860, serving in the Civil War, and attaining the rank of brigadier-general. He was United States consul at Cyprus (1865–77), where he made extensive archæological discoveries. In 1878 he became a trustee and director of the Metropolitan Museum of Art, in New York, a post he has since held. In 1897 he was awarded a Congressional medal of honor for conspicuous military service. He has written 'Cyprus: Its Cities, Tombs, and Temples,' and many monographs on art topics.

Céspedes, Pablo de, päb'lō dā thĕs'pā-dĕs, Spanish painter, sculptor, architect, and poet: b. Cordova 1538; d. there 26 July 1608. In 1556 he entered the University of Alcala de Henares, where he distinguished himself by his proficiency in the classics and Oriental languages. He also assiduously cultivated his genius for the fine arts. Having at last made these his principal pursuit, he proceeded to Rome, studied under Zucchero and Michael Angelo, and soon became renowned both for his frescoes and sculptures. In 1577 he obtained a prebend in the Cathedral of Cordova, and from that time resided alternately in his native town and in Seville. His best pictures are in Cordova, Seville, Madrid, and several towns of Andalusia; and are admired particularly for elegance and loftiness of design, complete knowledge of anatomy, the skilful employment of light and shade, warmth of coloring, accuracy of expression, and spirituality of composition. One of his most celebrated pictures is a 'Lord's Supper,' in Cordova Cathedral. He was the head of the then Andalusian school of painting, and numbered among his pupils some painters of distinction.

Céspedes y Borges, ē bôr'-gās, **Carlos Manuel de,** Cuban insurgent: b. Bayamo 18 April 1819; d. 22 March 1874. He studied at the University of Havana, and later at Barcelona, Spain. Implicated in Prim's conspiracy, he was banished from Spain (1843), and returned to Cuba to practise law. As leader of the revolt of 1868, he was chosen by the insurgents president of the newly proclaimed republic. He was killed in a skirmish with the Spaniards.

Cessart, Louis Alexandre de, loo'ē ä-lĕks-ändr dė cĕs-sär, French engineer: b. Paris 1719; d. 1806. He early entered the military service, and distinguished himself in the campaigns of 1743–6, during which he was present at the battles of Fontenoy and Rocoux. Bad health having obliged him to obtain his discharge, he entered the École des Ponts et Chaussées, where he displayed so much genius and industry, that in 1751 he was appointed general engineer of Tours. In 1775 he was removed to Rouen, and in 1781 proposed his plans for the construction of the harbor and works of Cherbourg. These have immortalized his name. He died while engaged in preparing a description of his most important labors. The work was published under the title of 'Description des Travaux Hydrauliques de L. A. Cessart' (1806–9).

Cessio Bonorum, sĕsh'ĭ-ō bō-nō'rŭm ("surrender of goods"), a process by which, according to the law of Scotland, a debtor against whom a warrant of imprisonment was issued after being charged to pay his debt, was entitled to be free from imprisonment, if innocent of fraud, on surrendering his whole estate to his creditors. Since the abolition of imprisonment for debt a debtor may be compelled to make *cessio bonorum* at the instance of a creditor.

Ces'tius, the name of a plebeian gens at Rome, of which two memorials have been preserved, one of them a bridge connecting the island of the Tiber with the right bank of that river, and the other a monumental pyramid standing at the gate San Paolo, partly within and partly without the walls of Aurelian. This pyramid stands upon a base of travertine. It is 125 feet high, and at the base 95 feet broad. It is built of bricks, encased in blocks of marble. In its interior there is a sepulchral vault 20 feet long, 13 feet broad, and 14 feet high. The walls of this vault were formerly decorated with paintings, but these are now faded, and only a few traces of them are still discernible. Two marble pillars which formerly supported the statue of the person whom the monument commemorates, stand in front of the pyramid. From the inscriptions still seen upon it, it has been inferred that the Cestius who caused this magnificent monument to be erected was a Roman knight of that name who lived in the

time of Cicero, and who, having enriched himself in Asia Minor, left part of his wealth for the purpose of perpetuating his memory in this way.

Cesto'da, a class of the phylum *Platyhelminthes,* represented by the tape-worms (q.v.). They are parasitic, usually ribbon-like worms, without any mouth or digestive canal, but with a slightly developed nervous system and an (excretory) water-vascular system. They are hermaphrodite, the joints as a rule numerous and containing male and female reproductive organs; the eggs are minute and very numerous. The mature worm is many-jointed, the joints budding out from near the head; in this form it is called a "strobila"; the terminal joints fall off, becoming independent (proglottis). The eggs, after fertilization, pass through a morula and gastrula stage, a circle of six hooks and suckers developing on the head and forming the *scolex,* or organ of attachment. They live as parasites in birds, beasts, and man, their earlier stages being passed in the bodies of a different host, as fishes, etc.

The Cestoda are divided into five families: (1) *Caryophyllæidæ;* (2) *Ligulidæ;* (3) *Tetrarhynchidæ;* (4) *Tetraphyllidæ;* (5) *Bothriocephalidæ;* (6) *Tæniadæ,* the last group being represented by the common tape-worm of man (*Tænia solium*). Consult: Leuckart, 'Die Menschlichen Parasiten,' two volumes; Braun, 'Die Tierischen Parasiten des Menschen; Linton, 'Notes on Entozoa of Marine Fishes of New England'; 'Reports of the United States Commission on Fish and Fisheries,' Parts I., II.; Stiles and Hassall, 'A Revision of the Adult Cestodes of Cattle, Sheep, and Allied Animals' (Bulletin 4 of the United States Department of Agriculture).

Cestracion, sĕs-trā'sĭ-ŏn, a genus of cartilaginous fishes allied to the sharks, of which the best known species is the Port Jackson shark of Australia (*C. philippi*). Four species are known, varying in length from four to five feet. They feed mainly on various kinds of mollusks. The family *Cestraciontidæ,* though now poorly represented, was very abundant in the earlier geological periods.

Ces'tus ("girdle"), a band or zone said to have been worn by Aphrodite or Venus, and endowed with the power of exciting love toward the wearer. The following is Pope's translation of Homer's description of it:

> In it was every art and every charm
> To win the wisest, and the coldest warm—
> Fond love, the gentle vow, the gay desire,
> The kind deceit, the still-reviving fire,
> Persuasive speech, and more persuasive sighs,
> Silence that spoke, and eloquence of eyes.

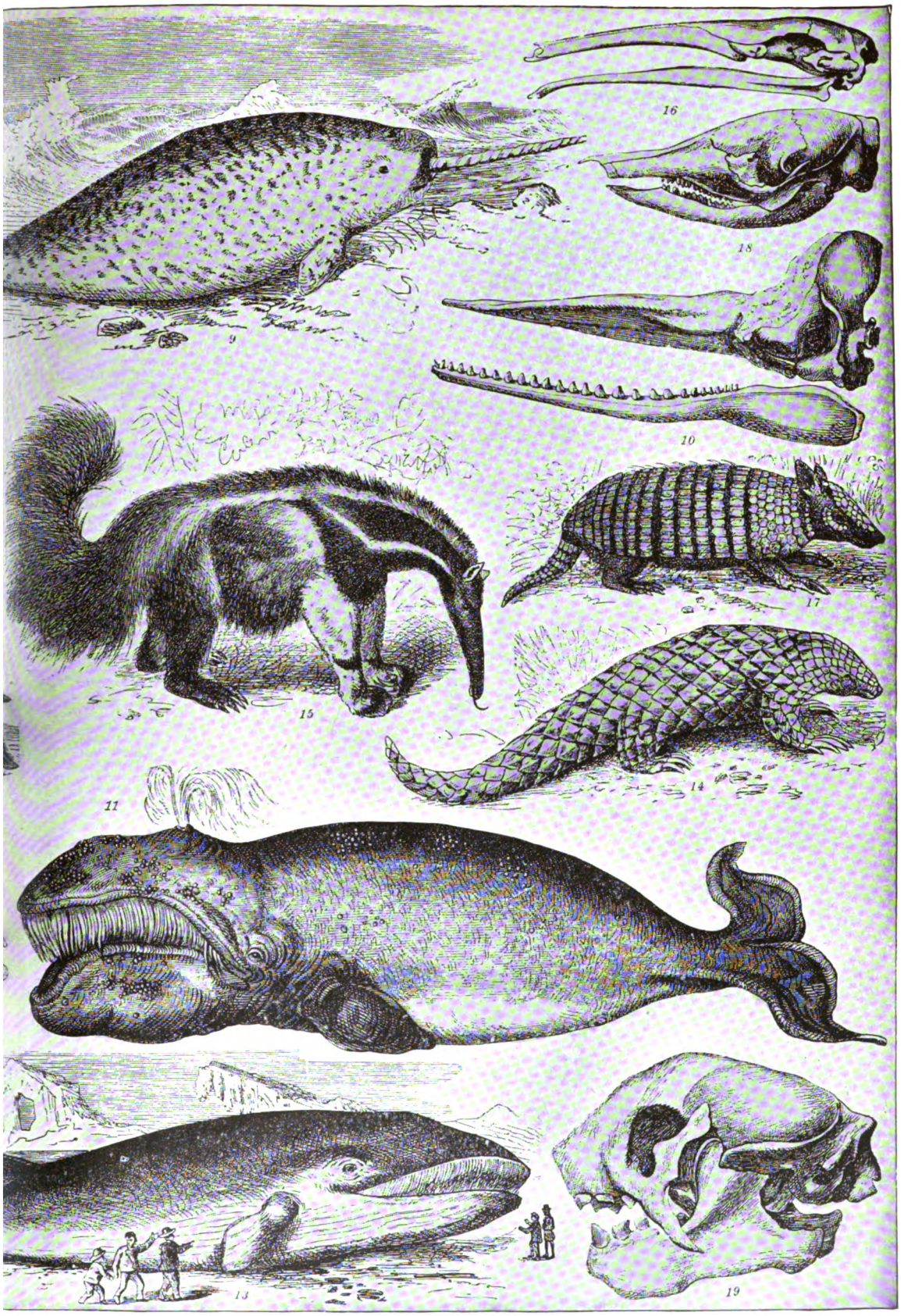
Cestus, or **Cæstus,** the boxing-glove of the Grecian and Roman pugilists. It consisted of thongs or bands of raw hide or leather, fastened to the hand, and reaching to the wrist. It was afterward enlarged so as to reach up to the elbow, and loaded with metal to increase the weight of the blow. The combat with the ordinary unloaded cestus was not more dangerous than a common modern boxing-match. Theocritus (Idyll. xxii.) has described one of these combats.

Cetacea, sē-tā'sē-ā, an order of mammals whose structure is so modified as to render them fit for an aquatic life. The whale-bone whales, the toothed whales, as the porpoise, narwhal, etc., and the extinct zeuglodon, represent the leading divisions of the group. The body is fishlike in form, the head passing gradually into the trunk which tapers posteriorly and ends in a bilobate caudal fin which is placed horizontally, not as in the fishes, vertically. The posterior limbs are wanting, and the anterior are converted into broad paddles or flippers, consisting of a continuous sheath of the thick integument, within which are present representatives of all the bones usually found in the fore limb of mammals, but they are not movably articulated, so that the paddle moves like a solid oar. The fish-like aspect is further increased by the presence of a dorsal fin; but this is a simple fold of integument, and does not contain, as in fishes, any bony spines. The vertebræ of the neck, seven in number, are united more or less to each other, so that in some they form a single solid piece. The right whale and its allies have no teeth in the adult state, their place being taken by the triangular plates of baleen or whalebone which are developed on transverse ridges of the palate. The frayed edges of these plates slope obliquely downward and outward from the middle of the roof of the mouth, so that when the mouth is shut there is a triangular space in the middle, the floor of which is formed by the enormous tongue. The water taken into the mouth is sifted by the frayed edges of the plates; it is driven out sideways between the plates and the tongue sweeps backward to the gullet any animals that have been caught in the fringes. But the fetal whales possess minute teeth, which are very soon lost. The porpoises, etc., when they possess teeth in one or both jaws, have them numerous and conical in form; they have no milk predecessors. The stomach is divided into several chambers, but these are not, as in ruminants, connected directly with the gullet; they are rather appendages of the pyloric portion of the organ.

The arrangement of the respiratory and circulatory systems, which enable the Cetacea to remain for some time under water, are interesting. The nostrils open directly upward on the top of the head, and are closed by valvular folds of integument which are under the control of the animal. When the animal comes to the surface to breathe it expels the air violently, and the vapor it contains becomes condensed into a cloud; if the expiration commences before the mouth of the spiracle or blow-hole is above the surface, a little water may be blown up like spray but no water from the mouth is thus discharged, for the soft palate firmly embraces during life the upper end of the larynx, so that the gullet is divided into two narrow passages, while the lungs have a continuous passage to the exterior. The blood vessels, especially those of the thorax and spinal canal, break up into extensive plexuses or networks, in which a large amount of oxygenated blood is delayed, and thus the animal is enabled to remain under water, the necessity for changing the air in the lungs being diminished.

Fossil Cetacea.— Bones of cetaceans, mostly allied to the living species, are found in the marine sediments of the Tertiary and Quaternary ages, and are occasionally dredged up from deep-sea deposits. The hard and heavy ear-

Fig. [1] Skull of Camel. [2] Llama. [3] Giraffe. [4] Skull of do. [5] Manatee. [6] Skull of Dugong. [7] Dolphin. [8] Skull of [14] Short-tailed Manis. [15] Ant-eater. [16] Skull of Do.



. [9] Narwhal. [10] Skull of Sperm Whale or Cachalot. [11] Greenland or Right Whale. [12] Skull of do. [13] Finner Whale.
Common Armadillo. [18] Skull of do. [19] Skull of Sloth.

Mau

bones are especially apt to be preserved as fossils. The zeuglodons and squalodons of the Eocene epoch represent a peculiar primitive group of cetaceans with two-rooted teeth. Very little is known of the evolution of this order of mammals.

Classification of Cetacea.— The sub-orders of cetacea are as follows:

1. *Mystacoceti,* baleen-bearing whales. Its families are: *Balænopteridæ,* rorquals, and other great whalebone whales; *Balænidæ,* right whales and kogias.

2. *Odontoceti,* of which the families are: *Physeteridæ,* sperm-whales (*Physeterinæ*), and beaked whales (*Ziphiinæ*); *Delphinidæ,* dolphins, porpoises, white whales, killers and the like; *Platanistidæ,* river dolphins; and the extinct *Squalodontidæ.*

3. *Archæoceti,* containing the extinct family *Zeuglodontidæ.* The most recent and important work on this order is Beddard's 'Book of Whales' (London 1900). See WHALE, and the names of the various groups and species of cetaceans.

Cetewayo, sĕt-ĭ-wä'yō, Kaffir chief or king, son of Panda, king of the Zulus: d. Ekowe 8 Feb. 1884. Disturbances as to the succession having arisen in Zululand, Shepstone, the representative of the Natal government, secured the recognition of Cetewayo as king in 1873. The latter, however, in spite of the obligations into which he had entered, proved a tyrannical ruler, and maintained a large army. A dispute which had arisen regarding lands on the frontier was settled by arbitration in favor of the Zulus; but on the refusal of Cetewayo to comply with the conditions imposed, war was declared against him by the British, and the king made prisoner soon after the battle of Ulundi, July 1879. In 1882 he visited England and was conditionally restored to part of his dominions. In the following year he was driven from power by the chief Usibepu, and remained under the protection of the British until his death.

Cethe'gus, Cai'us Corne'lius, Roman conspirator, one of the associates of Catiline. He was put to death in prison by order of the senate, at the instigation of Cicero, 68 B.C.

Cetinje. See CETTIGNE.

Cetiosaurus, sĕt-ĭ-ō-sâ'rŭs, a genus of amphibious dinosaurs (see DINOSAURIA), of which fragmentary remains have been found in the Lower Cretaceous (Wealden) of Europe.

Cette, sĕt, France, a seaport town in the department of Hérault, built on a neck of land between the lagoon of Thau and the Mediterranean, 23 miles southwest of Montpellier. The space enclosed by the piers and breakwater forming the harbor can accommodate about 400 vessels; and the harbor is defended by forts St. Pierre and St. Louis. A broad, deep canal, lined with excellent quays, connects the port with the Lake of Thau, and so with the Canal du Midi and the Rhone, thus giving to Cette an extensive inland traffic; and it has an active foreign commerce. The principal trade is in wine, brandy, salt, dried fruits, fish, dyestuffs, perfumery, and verdigris. Cette has shipyards, salt-works, glass-works, factories for the manufacture of syrups and grape sugar, etc., and carries on extensive fisheries. After Marseilles, it is the principal trading port in the south of France; and it is much resorted to as a watering place. Pop. (1901) 33,065.

Cettigne, Cetinje, chĕt tĕn'yā, Montenegro, the capital of the principality; situated in a lofty mountain valley, 19 miles east of Cattaro. It contains the palace of the ruler and the government buildings, a convent founded in 1478, a girls' institute and other schools, an arsenal, and a theatre. Turkish invaders sacked and burnt the town in 1683, 1714, and 1785. Many famous Montenegrin rulers lie buried here. Pop. about 3,500.

Ce'tus (Lat. whale), a large constellation lying on both sides of the equator, but mostly south of it, one of Ptolemy's original 48. It is surrounded by Pisces, Aries, Taurus, Eridanus, Fornax, Sculptor, and Aquarius. It contains the remarkable variable star Omicron Ceti, or Mira.

Cetyl, sē'tĭl, an alcoholic radical not yet thoroughly isolated, but supposed to exist in a series of compounds obtained from spermaceti.

Ceuta, thā'oo tä, Morocco, a strongly fortified place belonging to Spain, on the coast of Africa, opposite Gibraltar. The town occupies the site of the Roman colony of *Ad Septem Fratres,* so called from the seven hills rising here in a group, of which the most prominent are Montes Almina and Hacho; on the latter, the ancient Abyla (one of the Pillars of Hercules), is a strong fort, and on the former, among beautiful gardens, lies the New Town. Ceuta contains a cathedral, a hospital, and convents, but is chiefly of importance as a military and penal station. The place was a flourishing mart under the Arabs, and there the first paper manufactory in the Western world is said to have been established by an Arab who had brought the industry from China. In 1415 it was captured and annexed by the Portuguese, and fell to Spain in 1580. It has resisted several sieges by the Moors (1694-1720 and 1732), and is still the most important of the four African presidios. Pop. about 14,000.

Ceva, Tommaso, tōm-mä'sō chā'vä, Italian mathematician and poet: b. Milan 20 Dec. 1648; d. 3 Feb. 1736. He was admitted into the order of Jesuits in 1663, and spent his life as an instructor in various colleges. His more important mathematical works had reference to angles, for the trisection of which he invented a mechanical instrument. He wrote several biographies in Italian, and many poems in Latin and Italian, two of which, entitled 'Philosophia nova-antiqua'; and 'Puer Jesus', are still admired.

Cevallos, Pedro, pā'drō thā-väl'lōs, Spanish diplomatist: b. Santander, Biscay, 1761; d. Seville 29 May 1838. He studied at Valladolid, and entered on a diplomatic career. Having been appointed secretary to the embassy at Lisbon, he there married a niece of Manuel Godoy, Duke of Alcudia, the Prince of Peace, and became afterward minister of foreign affairs. In the disputes between Charles IV. and his son Ferdinand he adhered to the latter. Aware of the influence which Cevallos possessed over the Spanish people, Joseph Bonaparte was anxious to gain him over, and offered to take him into his service. Cevallos accepted with apparent willingness, but on arriving at Madrid

united with the Spanish junta against Joseph, and was sent by them on a mission to London, where in 1808 he published his celebrated work on Spanish affairs, referring more especially to the proceedings at Bayonne. After the Restoration he for some time maintained a great influence over Ferdinand, but on his opposing the marriage of the latter with a princess of Portugal he lost favor, was deprived of his office of secretary of state, and sent as ambassador to Naples and Vienna. On being recalled in 1820 he retired to private life.

Cevallos, Pedro Fermin, Ecuadorian lawyer and historian: b. Ambato about 1814. Besides holding several high professional positions he was a senator in 1867. His principal work is: 'Resumen de las historia del Ecuador,' in five volumes.

Cévennes, sā-vĕn, France, a southern district, which at one time formed the northern part of the government of Languedoc. During the wars against the Albigenses its mountains and valleys were the asylum of numerous persons who had renounced many of the beliefs of the Roman Catholic Church. It now forms part of departments Haute-Loire, Loire, Ardèche, Gard, and Aveyron.

Cévennes, sev-en' (ancient CEBENNA), the chief mountain range in the south of France. With its continuations and offsets, it forms the watershed between the river systems of the Rhone and the Loire and Garonne. Its general direction is from northeast to southwest, beginning at the southern extremity of the Lyonnais Mountains, and extending under different local names as far as the Canal du Midi, which divides it from the northern slopes of the Pyrenees. The Cévennes extend for over 150 miles, through or into nine departments, the central mass lying in Lozère and Ardèche, where Mount Lozère attains 5,584 feet, and Mount Mézen (the culminating point of the chain) 5,754 feet. The average height is from 3,000 to 4,000 feet. The mountains consist chiefly of Primary rocks, covered with Tertiary formations, which in many places are interrupted by volcanic rocks.

Ceylon (native SINGHALA, ancient TAPROBANE, an island possession and crown colony of Great Britain, in the Indian Ocean, about 60 miles southeast of the southern extremity of Hindustan, from which it is separated by the Gulf of Manaar and Palk Strait. It lies between lat. 5° 56′ and 9° 50′ N., and between lon. 80° and 82° E., having the shape of a pear, with the broad end south. Length, about 270 miles north to south; average breadth, 100 miles; area, 25,364 square miles. The northern and northwestern coasts are flat and monotonous, those on the south and east bold and rocky, presenting a highly picturesque appearance, which is further heightened by the exuberant vegetation, the noble palm forests, the luxuriant corn fields, and the verdant slopes of the mountains enameled with bright flowers, herbs, and creeping plants, whose delicious perfume spreads far and wide. Many parts of the coast, at its southern and northern extremities are studded with small, rocky, and verdant islands, some of them overgrown with palms, and presenting a singularly beautiful appearance. At Trincomalee, on the northeastern coast, there is one of the finest natural harbors in the world; at Galle on the southern coast there is also a harbor; while the harbor at Colombo, the capital, is capable of admitting the largest vessels, and is now the regular calling-station for mail steamers to and from Calcutta, China, and Australia. Between the islands of Manaar on the northwestern coast of Ceylon and the island of Ramiseram on the coast of India, is a ridge of sandbanks called Adam's Bridge, which nearly connects Ceylon with the continent, being intersected only by three narrow shallow passages, the remainder being covered with two or three feet of water at full tide. These channels admit only very small vessels, but ships of some size can get through between Ramiseram and the mainland; and schemes for the passage of larger vessels have been projected, as also for a railroad along Adam's Bridge.

Mountains.— The mountainous regions of Ceylon are confined to the centre of the south and broader part of the island. They gradually diminish to hills of moderate elevation as they recede from the central mass, and are succeeded on the western side by a flat tract extending to the coast. Their average elevation is somewhere about 2,000 feet, but there are several summits upward of 7,000 and 8,000 feet high. The highest summit is Pedrotallagalla (8,260), but Adam's Peak, reaching 7,420 feet, is the most remarkable from its conical form, the distance from which it is visible from the sea, and from the sacred associations with which it is connected, the summit being the point from which Buddha, according to his followers, ascended to heaven, a gigantic footprint bearing testimony to the fact. Other summits are Tolapella (7,720) and Kirrigalpota (7,810). The forms of the mountains of Ceylon are singularly varied. They most frequently occur connected in chains, and terminate in round or peaked summits. Their sides are always steep and occasionally precipitous and rocky. There is no proportional correspondence between the heights of the mountains and the depths of the adjoining valleys, and often the valleys are extremely narrow. The deepest are in the heart of the mountains. Some are between 3,000 and 4,000 feet deep, and not over half a mile wide.

Rivers and Lakes.— The rivers of Ceylon, though numerous, especially on the southern and southwestern sides, are small, being merely mountain streams, navigable only by canoes, and that but for a short distance from their mouths. The Mahaveli-ganga, which rises near Adam's Peak, and falls into the sea by a number of branches near Trincomalee, is by far the most important. It has a course of 134 miles, and drains upward of 4,000 square miles. Timber grows on its banks in great abundance, consisting of halmalille, ebony, satin-wood, etc., which is floated down to the harbor during the freshets. Of the remaining rivers the Kalaniganga, the Kala-ganga, and the Maha Oya reach the sea on the western coast; and the Gintota-ganga at Galle. All the rivers are liable to be surcharged with rain during the monsoon, and to inundate the level country, while the heat of the sun on drying the country produces malaria. There are numerous extensive lagoons or back-waters round the coasts, but no lakes in the island worth noticing, the largest being only four miles broad. There are rills and streamlets rushing along in every direction among the mountains,

so overhung with superabundant vegetation as to be frequently invisible.

Geology and Mineralogy.— Ceylon is mostly formed of ancient stratified rocks, but owing to the obliteration of fossil remains it is doubtful whether they have been deposited on the beds of seas or lakes. The mountains are composed of Primary and metamorphic rocks, the prevailing rock on the island being gneiss, though laterite (or «cabook») and a sort of dolomite also occur in considerable quantity. In the Nuwara-Eliya district and elsewhere there are large alluvial tracts. Basalt is found near Galle and Trincomalee, and at Pettigallakanda an ancient lava occurs. The soil is mostly formed from the disintegration of gneiss. The western coast of the island is believed to be rising. Plumbago is found in sufficient quantities to make it of commercial importance, anthracite is obtained, and among the metals occurring in the island are iron in fair quantity, manganese, gold, platinum, molybdenum, nickel, cobalt, copper, and tin. No coal has been found, but nitre and salt occur (the latter is also a somewhat important article of manufacture). Gems of many kinds are abundant, particularly near Ratnapura. They are found either embedded in the rock or washed down in the alluvium of river-beds, and include zircons, amethysts, cat's-eyes, topazes, moonstones, garnets, spinel, sapphires, rubies, cinnamon stones, etc. There are hot springs at Bintenna, Trincomalee, and Puttalam.

Roads and Transportation.— Ceylon is now well provided with roads. A highway has been made from Colombo to Nuwara-Eliya, 6,000 feet above the level of the sea. A continuous line, 769 miles in length, makes the entire circuit of the coast, and every town of importance is connected by roads with the two chief cities. The roads in general are good, many of them being macadamized, and in the neighborhood of the chief towns are adapted for carriages. During the monsoons, however, the roads in many parts are impassable from inundations. The building and maintenance of roads, bridges, streets, and canals forms one of the chief items of expenditure of the government. Railroad extension is also a government affair, and there are now about 300 miles in all, the main line being that between Colombo and Kandy (75 miles). In the early part of the 19th century there was not a single road in the country, merely a few pathways, the greater part of the island being then covered with impenetrable forests.

Climate.— Where the jungle has been cleared away and the land drained and cultivated, the country is perfectly healthy; where low wooded tracts, and flat marshy lands abound, covered with a rank, luxuriant vegetation, the climate is eminently insalubrious, showing, what is now pretty well understood, that mere heat has little to do with the unhealthiness of tropical climates. The heat is not so great as on the neighboring coast of India, the sea-breezes moderating the temperature. At Colombo, on the western side of the island, near the seventh parallel of north latitude, the mean daily variation of the temperature does not exceed 3°, and the annual range is from 76° to 86° 30′ F. At Nuwara-Eliya (6,000 feet high) the annual range is from 32° to 80°. The eastern part of the island, being exposed to the northeastern monsoon, has a hot and dry climate, resembling that of the coast of Coromandel; while the western division, being open to the southwestern monsoon, has a temperature and humid climate like that of the Malabar coast. The quantity of rain that falls annually in Ceylon is estimated at three times the quantity that falls in England, the rains being less frequent, but much heavier. The interruption which the course of the monsoons meet with from the mountain ranges of the island causes deluges of rain to fall on one side, while the other is parched with drought. At Kandy, in the interior, the average annual fall of rain is 85.3 inches; at Colombo, on the seacoast, 75 to 80 inches. The prevalent diseases are those of the liver and intestines, often accompanied by fever. Elephantiasis and other cutaneous complaints are common. The very fatal disease called beriberi (*Hydrops asthmaticus*) occasionally occurs, being almost peculiar to the island.

Animals.— Most of the animals found on the opposite continent are native to this island, excepting the royal tiger, which does not exist here. Elephants are numerous, especially in the northern and eastern provinces, where they sometimes do great injury to the growing crops. The elephants of Ceylon are esteemed for their superior strength and docility. The eagerness with which they are hunted has greatly diminished their numbers. Since 1869 licenses for the capture and exportation of elephants must be obtained from the government. Bears, buffaloes, leopards, jackals, monkeys, and wild hogs, are numerous. There are several species of deer, of which the elk and fallow deer (properly the great red Sambar and spotted axis) are most abundant. Porcupines, bandicoots, squirrels (flying and other), bats, mungooses, are to be found, as are also the pangolin or scaly ant-eater, and the loris or Ceylon sloth. Flying-foxes and rats are numerous. Pheasants, snipes, partridges, pigeons, peacocks, and a great variety of birds, of splendid plumage, are plentiful. Crocodiles, serpents, and reptiles of all sorts abound. Of the snake tribe, consisting of about 26 different species, six only are venomous. Among the insects are the leaf and stick insects, the ant-lion, the white ant, etc.

Vegetable Products.— In the luxuriance of its vegetable productions, Ceylon rivals the islands of the Indian Archipelago, and in some respects bears a strong resemblance to them; its most valuable products are tea, rice, coffee, cinnamon, and the cocoanut. Coffee used to be the chief cultivated crop, but disease has within recent years much reduced the product. Cinnamon grows in the southwest, to which it is almost exclusively confined, requiring a sandy soil with a moist atmosphere. The trade in this spice was reserved as a government monopoly by the Dutch when they had possession of the island; all that was collected beyond the quantity which it was thought could be sold at a monopoly price being burned. This absurd system was followed by the English for some years after their conquest of Ceylon, but was abandoned in October 1832, when the trade in cinnamon was declared free, subject to a duty on exportation. The cocoanut-trees grow along the entire western and southern coasts in countless numbers, each tree producing from 50 to 100 nuts in the year. Every part of this invaluable tree is capable of being turned to profitable account. The Palmyra palm, which grows principally in the northern part of the island, is of

hardly less importance than the cocoanut, being productive in seasons of drought, when the crops fail. The jaggery palm, or kittul-tree, is cultivated for the sake of its sap, which yields a coarse sugar; its pith furnishes a kind of sago; and its fruit is also eaten. The taliput palm also abounds, as do the jack- and breadfruit-trees, the fruit of which is used by the natives for food, both raw and cooked; the timber, also, of the jack-tree, not being subject to be attacked by the white ant, is much used by the natives for making furniture, and in house-building. The Ceylon areca nut, celebrated for its superior qualities, is exported in large quantities. Tobacco is raised principally in the northern district, and is of excellent quality. Indigo grows wild, but is not sought after. The cardamom plant is abundant, but inferior to that of Malabar; fruits and culinary vegetables are produced, the latter in the elevated districts, in great variety and profusion. The island abounds with timber of various descriptions, including calamander, satin, rose, sapan, iron, jack, halmalille, and other beautiful woods adapted for cabinet work. Agriculture generally, and the cultivation of the more valuable native products of the island in particular, are improving. As already stated, coffee once was the chief crop, but latterly the cultivation of tea, cinchona, and cacao has been carried to such an extent that the island has become less dependent on a single article of produce. Notwithstanding the acknowledged fertility of Ceylon, the capabilities of its soil where justice is done to it, and the efforts now in progress to develop these capabilities, by far the largest proportion of the island is still uncultivated. There are a few natives who possess considerable estates in land; but the law of inheritance has, for the most part, caused a minute subdivision of the soil, to a degree very unfavorable to its improvement. The British government claims the proprietorship of all the waste lands, which are now disposed of by public sale. Among works carried on by the government are irrigation works in suitable localities, including the cutting of channels, the construction of annicuts or dams, and the formation and repair of tanks. Some of the ancient works of this kind are of great magnitude. There is also a government forest department, part of the work of which is to provide fuel for the railroads and timber for government works.

Pearl-fishery, etc.— There has long been a pearl-fishery on the coast of Ceylon, carried on as a government monopoly. The fishery sometimes fails for years, there having been none, for instance, between 1837 and 1854, or between 1863 and 1874. Although the government still continued a strict surveillance over the banks, and occasionally subjected them to a careful examination, scarcely any trace of the pearl oyster was to be found. No cause has yet been discovered for this disappearance. When the pearl-fishery is in existence it is confined to the Gulf of Manaar, where the oyster banks extend for 60 or 70 miles along the coast south of Manaar, and perhaps 10,000 people, including 2,500 divers, will assemble in the fishing season. The Ceylon pearls are whiter than those of Ormuz or the Arabian coast. The chank or conch fishery was at one time carried on to a great extent, employing about 600 divers, but has greatly declined owing to the little demand now made for them in Bengal, to which the greater part were sent. The chank is a seashell (*Voluta pyrum,*) adapted for cutting into rings, these being formerly used in great numbers by the native women of Hindustan for bracelets and anklets.

Manufactures and Trade.— The manufactures of Ceylon are very unimportant with exception of arrack, which is distilled from the juice of the cocoanut-tree. The spinning and weaving of cotton goods, generally of the coarsest kind, was at one time a considerable industry, but is now dying out. There are numerous oil-mills for pressing the cocoanut kernels to express the oil. The Singhalese make good artisans, as is experienced at Colombo, where they are employed in making steam engines and other machinery. They are skilful in carpentry and wood-work, expert workers in gold and silver, and excel in the manufacture of lacquered ware. Salt is a government monopoly, being collected from shallow lagoons, which at certain seasons are overflowed by the sea, or it is manufactured in pans, the property of the government. The exports are chiefly tea, coffee, cinchona, cinnamon, cocoanut products, areca nuts, cacao, cardamoms, plumbago, tobacco. Tea has only begun to be exported in recent years, and the export has increased from 2,392,975 pounds in 1884, to more than 130,000,000 pounds. The total value of exports in 1899 was about $56,000,000; of the imports about $51,000,000. The trade of Ceylon is chiefly carried on with Great Britain and India, the former of which received from the island in 1899 goods approximating in value to $26,000,000, and sent thither goods to the value of over $7,000,000. The chief article exported to Great Britain is tea, the value of which in 1899 reached nearly $19,000,000. The only other exports thither worth mention are coffee, cocoanut oil, and plumbago. The principal articles of import from Great Britain are coal, cotton manufactures, apparel and haberdashery, iron and steel manufactures, machinery, etc. The value of imports from Great Britain of manufactured cotton goods in 1899 was $1,138,000; of wrought and unwrought iron, $700,000; of coal, $975,000. From other countries are imported rice, dried fish, wheat, sugar, and various other commodities.

Government, etc.—The government of Ceylon is conducted by a governor and two councils, executive and legislative, of both of which the governor is president. The first is composed of 6 members, including the governor; the other of 17 members, including the members of the Executive Council, 4 other office-holders, and 8 unofficial members selected by the governor as representative of the different classes and interests in the community. The powers of the councils are limited, being wholly subservient to the governor, who can carry into effect any law without their concurrence. All laws must be approved of by the secretary of state for the colonies before they can take effect. Any individual properly qualified may be appointed to the most responsible situation, without reference to service, nation, or religion, and native Singhalese have occupied some of the highest posts. The island is divided into nine provinces — the Eastern, Western, Northern, Southern, Central, North Central, Northwestern, Sabaragamuwa, and Uva, and subdivided into districts. In each province is stationed a government agent. For

the administration of justice there are in the civil and criminal departments a supreme court, established at Colombo; also a vice-admiralty court, and provincial courts, stationed in various districts; besides magistracies. There are municipalities or local boards in the towns, and there are also native village councils. The chief sources of revenue are the customs duties, railroad receipts, land rents, and salt farms. The chief articles of export are now free. The revenue for 1898 amounted to $12,600,000; expenditure, $11,400,000. The public debt amounts to about $17,300,000; but the finances are in a very healthy condition, as the public debt of the colony has been mostly incurred for the construction of railroads.

People.— The present population of Ceylon is composed of Singhalese, Cingalese, or Ceylonese, descendants of immigrants from Hindustan who entered the country in the 6th century B.C., Malabars or Tamils, originally from southern India, Moors, Malays, Veddahs, and a small proportion of Europeans and their descendants. The Singhalese inhabiting the coasts are a mild, timid race, obsequious to strangers, and hospitable and humane. Their statue is rather below the middle size; their limbs slender, but well shaped; eyes dark, finely cut features, hair long, smooth, and black, turned up and fixed with a tortoise-shell comb on the top of the head; color varying from brown to black, or rather from the lightest to the darkest tints of bronze. The Singhalese of the interior, or Kandian Singhalese, are a superior race, being stouter, handsomer, and of more manly and independent bearing, with a greater degree of intelligence. The Malabars of Ceylon are similar in all respects to those of the continent. The Mohammedans or Moors are an energetic and industrious people, and engross a large proportion of the commerce and traffic of the island. The Veddahs, a savage race, are supposed to be a portion of the aboriginal inhabitants of Ceylon. They inhabit the most secluded and inaccessible parts of the island, and subsist entirely on wild fruits and animals. A cloth round the loins is their only clothing; and their habitations, generally of small dimensions, are formed for security among the branches of large forest trees. They are a robust and hardy race, but extremely peaceable and inoffensive. The other inhabitants of the coast consist of Dutch, Portuguese, and English; some Malays or natives of the Eastern Archipelago, a few Chinese and Parsee traders, and a various population sprung from the intermixture of these races with each other. The descendants of the Dutch and other Europeans are known as burghers. The population is rapidly increasing. In 1832 it scarcely amounted to 1,000,000; while in 1881 it was 2,750,000. In 1901 the total was 3,576,990, including 2,334,817 Singhalese, 952,237 Tamils, 224,719 Moormen, and 9,583 Europeans. The increase is partly to be attributed to the number of coolies who come from India for employment on the plantations.

Religion, Language, Education.— More than half the population are said to be Buddhists, and about 500,000 are of the Hindu religion. Buddhism chiefly prevails in the interior, and generally among the Singhalese of the seacoasts. It is maintained and protected by the British government, agreeably to the treaty of 1815. On the western and southwestern coasts numbers of the Singhalese profess the Roman Catholic religion. There are a number of Episcopal clergy in the island, subordinate to the bishop of Colombo; various other Protestant bodies have places of worship, but the Protestants are less than half the number of the Roman Catholics. The Singhalese have a colloquial language peculiar to themselves, but their classic and sacred writings are either in Pali or Sanskrit. The Malabars use the Tamil. English is becoming more and more common, "and there is scarcely a roadside village in Ceylon now where the traveler could not find some persons to speak English, or interpret for him." The government has a department of public instruction, and good progress is being made in education throughout the island. On 1 Jan. 1891, there were 146,500 children participating in public instruction, a number of the schools being maintained or aided by the government. There are schools maintained also by the Church Missionary Society, by the Wesleyan, the American, and the Baptist Missionary societies, besides a number of private and some regimental schools.

Antiquities, History, etc.—The Singhalese annals contain a historical record of events for 24 centuries; and their authenticity, as regards description of ancient towns and buildings, and other works of art, is established by existing ruins, proving that the island had been, at a remote period, inhabited by a powerful and numerous people. The ancient capital, Anuradhapura, and its neighborhood contain many interesting and splendid relics of the ancient Singhalese civilization. Chosen as the capital in 437 B.C., it received fully a century later various relics of Guatama Buddha, and to contain these as well as other sacred articles many temples were erected. In the 1st century of our era the city occupied an area of 256 square miles, enclosed by 64 miles of walls. A remnant of the celebrated bo-tree, said to have sprung from that under which Gautama sat at the time when he became a Buddha, is still seen enclosed in the court of a temple. Here, too, is the so-called Brazen Palace, originally built in 142 B.C., and consisting of 40 rows of 40 pillars each. Dagobas, or shrines containing relics of Buddha, are very numerous. They are of brick, incrusted with a special preparation which takes on a fine white polish. One of the finest of these monuments is the Ruwanwellisaye, built about 140 B.C.; but the most beautiful of Ceylonese dagobas is the Toopharamaya, with many finely sculptured columns. Jaitawanaramaya, originally 315 feet in height, is now 269 feet high, and, like most of the ruins of the island, is overgrown by trees and brush-wood. Among the most curious and notable of the ancient relics which invest Anuradhapura with such profound interest are the numerous tanks constructed at various dates between 200 B.C. and 300 A.D., and in the 12th century. Some of these are of enormous size, and several have been restored and applied to their original purpose of irrigation. From the 8th to the 13th century the capital was Pollanarrua, now Topare, near which also are found many splendid ruins, including a fine rock temple. At Dambula, there is a celebrated cave temple, dating from the 1st century B.C.

Ceylon was known to the Greeks as Taprobane. In 543 B.C. it was conquered by Vijaya, a prince from the mainland of India, and for

several centuries the island enjoyed great prosperity under the generally beneficent rule of his dynasty. The Hindu incomers brought with them the civilization of their own country, and great part of Ceylon became covered with towns and villages. Several of Vijaya's successors had to contend with invading Malabars, and these ultimately secured the sovereignty. A restoration of the line of Vijaya in the 11th and 12th centuries contributed to the return of something of the ancient grandeur of the island. Little was known regarding it in Europe until 1505, when the Portuguese established a regular intercourse with Ceylon, being encouraged thereto by a native king. The Portuguese were subsequently expelled by the Dutch in 1658, after a stubborn struggle of 20 years' duration. The Dutch soon opened up an extensive and profitable trade with Holland, and they constructed several canals to serve as means of communication between their various posts on the island. Their policy, however, though beneficial on the whole to the Singhalese as well as themselves, was essentially a selfish and exclusive one. British intercourse with the island began in 1763, and in 1795, owing to the war with France and Holland, Great Britain was induced to attempt an effective occupation of it. In that year Trincomalee, and in the following year Colombo, was captured; and by these victories all the Dutch forts were transferred to Great Britain. By the peace of Amiens (1802) the whole coast territory was formally ceded. The king of Kandy, who remained in possession of the central mountainous region, perpetrated such atrocities on his own people that many of their chiefs in 1815 entreated Great Britain to depose him. A short campaign was ended by the capture of the tyrant and his deportation as a prisoner to India, and since then the whole island has been under direct British rule. A serious rebellion in 1817 and minor ones in 1843 and 1848 have been the only breaks in the generally tranquil subsequent history of the colony. British rule has contributed very largely to the material advancement of the island by the construction of roads and railways, the extension of the Dutch canal system, the restoration of irrigation tanks, the bridging of rivers, and the development of its great natural resources. Two important events in its modern history have been the rise and decline of coffee-planting (say from 1837 onward, and the substitution of tea-planting (about 1878) in its place. The decline of coffee-planting, as is well known, has been caused by a leaf-fungus. The planting of cinchona, cacao, and rubber-trees has also helped to add to the resources of Ceylon in recent times. In 1901 a considerable number of Boers, captured in the South African war (q.v.), were sent to Ceylon.

The principal towns of the island are Colombo, Trincomalee, Kandy, Galle, Jaffna, and Kornegalle.

Ceylon Moss. See AGAR.

Chapu, chä-poo′ or shä-poo′, or **Chapoo,** China, a seaport town in the province of Cheh-Chiang (or Che-Kiang), on the north side of Hang-Chau Bay, 35 miles from Ning-Po. Although not a treaty port, it carries on a considerable commerce with Japan. Its European trade is conducted through the treaty port of Ning-Po, and is largely in green tea. Its imports are ginseng (from the United States), and manufactured goods. The native industries are sedge hats and mats, fishing, and silk-making. Merchant vessels do not touch at Chapu ordinarily, although Chinese and Japanese junks put in regularly. Pop. about 80,000.

Chabaneau, Camille, kä-mĕl shä-bä-nō, French philologist: b. Nontron 4 March 1831. Since 1879 he has been professor of romance languages at Montpellier. He has written 'Histoire et Theorie de la conjugaison Française' (1868); 'Grammaire Limousine' (1876); 'La Langue et Littérature Provençales' (1879); 'Biographies des Troubadours' (1885); and has contributed largely to the 'Revue des Langues Romanes.'

Chabas, François, fräṅ swä shä-bä, French Egyptologist: b. Briancourt 2 Jan. 1817; d. Versailles 17 May 1882. Though at first engaged in commerce, he found time to become a learned linguist, but it was not till 1851 that he gave himself up to the study of hieroglyphics. The first results of his studies appeared in 1856, followed by a series of invaluable books and papers, elucidative chiefly of two important periods of ancient Egyptian history — the conquest of the country by the Hyksos, and the time of their expulsion. Among the more important of his many books are 'The Shepherds in Egypt'; 'History of the 19th Dynasty and especially of the Period of the Exodus'; and 'Studies of Historical Antiquity from Egyptian Sources.' From 1873 to 1877 he edited 'L'Egyptologie.'

Chabazite, a member of the zeolite family of minerals of variable composition, but in general definable as a hydrated silicate of aluminum, calcium, and sodium, with small amounts of potassium, and occasionally of barium and strontium. It has a hardness of from 4 to 5, and a specific gravity of about 2.1. It is transparent or translucent, and varies in color from white to pale red or yellow. It occurs in rhombohedral crystals that are sometimes barely distinguishable from cubes, and also in amorphous forms. It is widely distributed, and usually occurs in connection with basalt, syenite, gneiss, or mica, or hornblende schist.

Chabert de Cogolin, Joseph Bernard, zhō-zĕf bär-när shä-bär dė kō-gō-lăṅ, MARQUIS, French geographer: b. Toulon 28 Feb. 1724; d. 1 Dec. 1805. He entered the marines as a cadet in 1741. In 1750 he sailed to the North American coast, and on his return published the result of his observations in an astronomical and hydrographical work, entitled, 'Voyage sur les Côtes de l'Amérique Septentrionale' (1753). In 1758 he was chosen a member of the Academy. In the American war Chabert distinguished himself so highly that in 1781 he was made commander of a squadron. In 1792 he was made vice-admiral. During the same year the Revolution drove him to England. In 1800 he lost his sight in consequence of his intense application to study, and in 1802 returned to Paris, where Bonaparte assigned him a pension. In 1804 he was appointed a member of the Bureau des Longitudes, and in 1805 presented to it a map of Greece and a description of the coasts of that country.

Chablais, shä-blā, France, a district in Savoy, south of the Lake of Geneva. At one time it formed part of the kingdom of Bur-

gundy, but in the 11th century came into the possession of the counts of Savoy. In 1860 it was ceded to France, along with the rest of Savoy, by Victor Emmanuel, king of Sardinia. It now forms the arrondissement of Thonon (its ancient capital), in the department of Haute-Savoie.

Chablis, shä blē, **France,** a town in the department of Yonne, on the left bank of the Serein, 11 miles east of Auxerre. It stands in the midst of vineyards which produce the celebrated white wine known by its name. The annual product is about 4,400,000 gallons, but the quantity sold over the world as Chablis is much greater. Pop. 2,400.

Chabot, François, fräṅ-swä shä-bō, French revolutionist: b. Saint Geniez, France, 1759; d. Paris 5 April 1794. In early life he entered the Capuchin order. The treatises of casuistry which he perused in order to prepare him for the confessional he claimed to have corrupted his morals, and on the suppression of the monasteries, though still professing to be a priest, he gave himself up to the most scandalous excesses. The Bishop of Blois nominated him his vicar-general, and succeeded in getting him chosen deputy to the national convention for the department of Loire-et-Cher. In this capacity he displayed the bitterest animosity against the king and his ministers, and all deputies friendly to moderate courses; and labored incessantly to overturn the throne. On the night of 10 Aug. 1792, he preached in a church of the Faubourg St. Antoine, and urged the most violent incitements to insurrection; though on the following day he is said to have saved some priests and the Abbé Sicard, the celebrated teacher of the deaf and dumb, from the fury of the populace. His party, from occupying the higher seats of the national convention, were designated by the name of the Mountain, which they have since retained. The conversion of the cathedral of Nôtre Dame into the Temple of Reason is said to have originated with Chabot. He at last became suspected by his party, chiefly in consequence of his marriage with a young and beautiful Austrian, and the favoritism he displayed toward his two brothers-in-law, who were striving to enrich themselves in the general disorder. Along with several other deputies he was accused of having appropriated the effects of the former East India Company, and vainly tried to save himself by reminding Robespierre of the services he had rendered him. When he saw that he was lost he swallowed poison, but suffered such excruciating pains that he took an antidote to remove them. Three days after he was guillotined. His brothers-in-law shared his fate.

Chabot, Philippe de, fē-lēp dė, French general: b. about 1480; d. 1 June 1543. Having bravely defended Marseilles in 1524, he was made prisoner at Pavia in 1525. Appointed admiral immediately after his release, he was sent to Italy in 1529 to negotiate the ratification of the treaty of Cambrai by Charles V. Made commander-in-chief of the forces in Savoy in 1535, he effected the conquest of part of that country and of Piedmont, but was censured for not following up his victory. On his return to France charges of frauds upon the national treasury were brought against him. Found guilty and imprisoned, he was soon afterward pardoned by the king at the urgent solicitation of the duchess d'Ėtampes, and reinstated in his position. He is said to have been the first to suggest the project of colonizing Canada.

Chabrias, kā'brĭ-ăs, Athenian general. In 392 he succeeded Iphicrates in the command of the Athenian forces before Corinth, was afterward sent to chastise the Æginetes for depredations on the coast of Attica, and assisted Evagoras in Cyprus, and Acoris in Egypt, against the Persians. In 378 he commanded the army which the Athenians sent to the aid of Thebes against the Lacedæmonians, under Agesilaus, on which occasion he saved his troops from impending defeat by a military manœuvre renowned in antiquity, commanding them to await the attack of the enemy with pointed spear and shield, resting on one knee. In 376 he won an important victory over the Lacedæmonian fleet off Naxos. The Athenians having abandoned the alliance of Thebes, he defended Corinth against Epaminondas. He took part in the expedition against Thrace at the outbreak of the so-called social war. At the siege of Chios his vessel was the first to enter the harbor, but becoming isolated and disabled was soon abandoned; he alone refused to save his life, and fell fighting, 357 B.C. He was the last of the great Athenian generals. Demosthenes said of him that he conquered 17 cities, took 70 vessels, made 3,000 prisoners, and enriched the treasury of Athens with 110 talents. One of his apothegms, for which he was celebrated, was that an army of stags led by a lion is superior to an army of lions led by a stag. His life was written by C. Nepos.

Chabrier, shä-brē-ā, **Alexis Emmanuel,** French composer: b. Ambert, France, 18 Jan. 1841; d. Paris 13 Sept. 1894. He at first studied law, but presently turned his attention to music. He composed the operas of 'Gwendoline' (1886); and 'Le Roi Malgre Lui' (1887). Other works by him are 'Dix Pieces Pittoresques'; and 'España,' an orchestral rhapsody.

Chac-Mool, shäk-mool', according to tradition, a chief of the Maya Indians of Yucatan. In 1876 a statue was discovered in the ruins Chichen-Itza, Yucatan, to which Le Plongeon gave the name of Chac-Mool, because he supposed it to be a representation of the chief. The statue was taken by the Mexican government and placed in the National Museum of Mexico, but the correctness of Le Plongeon's identification is in question among archæologists.

Chacabuco, chā-cā-boo'kō, Chile, a mountain and mountain pass, 28 miles north of Santiago, in the province of that name. It is celebrated as the scene of a decisive victory of the republicans over the royalist troops on 12 Feb. 1817.

Chacma, chăk'ma, the Hottentot name for the baboon (*cynocephalus porcarius*) native to western Africa. It is grayish-black in color, and has a well-marked crest of hair along the neck. It is larger than the allied species of its native region. See BABOON.

Chaco, chä'kō, South America, the name formerly given to a region of vast size in the central part of the continent, on the left bank of the Paraguay River, and the right bank of the Paraná, and extending below the confluence of those rivers, from about 20° to or beyond 28° south latitude. For years it was claimed by both Paraguay and Argentina, but effectively occupied by neither. The southern portion, below the Pilcomayo River, now belongs to Argentina, and has been divided into the territories of El Chaco and Formosa. The northern and larger portion, from the Pilcomayo River to Bolivia, belongs to Paraguay, and is called El Gran Chaco, or Paraguay Occidental. See CHACO, EL; CHACO, EL GRAN.

Chaco, El, a territory ("territorial government") of Argentina, bounded on the north by the territory of Formosa, on the east by Paraguay and the province of Corrientes, on the south by the province of Santa Fé, and on the west by the provinces of Salta and Santiago del Estero. Its area is 62,000 square miles, and its population about 30,000. Its capital is Resistencia, on the right bank of the Paraná River, with a population of 3,000. The districts near the river are inhabited by civilized people, who cultivate the soil or exploit the forests, while Indians roam in the interior. The national government has encouraged immigration by selling land to settlers at the average price of 31 cents for an acre.

Chaco, El Gran, the western section of the republic of Paraguay. It is also called Paraguay Occidental or El Chaco Paraguayo. It extends northward and westward from the right bank of the Paraguay River to the frontiers of Bolivia; Brazil bounds it on the northeast; Argentina on the southwest. By a convention concluded 3 Feb. 1876, between Paraguay and the Argentine Republic, the territory between the Pilcomayo and Bermejo rivers was surrendered to Argentina, but the part of Chaco which extends from Bolivia to the Rio Verde was acknowledged to belong to Paraguay. The other section of Chaco, which lies between the Rio Verde and the Pilcomayo, was subsequently awarded to Paraguay by the arbitrator chosen by both governments, R. B. Hayes, President of the United States (12 Nov. 1878). The commemoration of this event, and as a compliment to the arbitrator, the name of the principal town of Gran Chaco, was changed from Villa Occidental to Villa Hayes, by which name it is now known. The interior of Gran Chaco is almost entirely in the possession of nomadic tribes of Indians, some of them hostile to white men. Save Villa Hayes, Bahia Negra, and Fuerte Olimpo, there were, until quite recently, no settlements within its limits. It was regarded as a comparatively worthless, swampy, uninhabitable region. But surveys disclosed large tracts of land as desirable as any in that part of the world can be — exceedingly fertile, suitable for agricultural and grazing purposes, and in part covered with forests of valuable hard woods. The sales of such lands have greatly increased the receipts of the Paraguayan treasury. Stock-raising has become a profitable industry along the banks of the Paraguay River and for a distance of 30 miles inland. Special interest attaches to the plan for improving navigation on the Pilcomayo River, and thus furnishing a direct outlet for the natural products and manufactures of pent-up Bolivia, via the Paraguay and Paraná rivers to Buenos Ayres and Montevideo. The area of Gran Chaco is approximately 91,499 square miles, somewhat less than one half of the total area of Paraguay.

Chacornac, Jean, zhŏñ shä-kôr-näk, French astronomer: b. Lyons 21 June 1823; d. Paris 20 Sept. 1873. He is principally known for his discoveries of asteroids, which came about in connection with his work on the formation of ecliptic charts of the stars, and for the charts just mentioned. His asteroid discoveries were six in number, and most of his work was done at the Paris Observatory under Leverrier.

Chad, chăd. See TCHAD.

Chad'band, Rev. Mr., a personage in Dickens' 'Bleak House.' He is a hypocritical minister, who pretends to be humble and to despise the world, but is in reality extremely selfish and self-indulgent.

Chadbourne, chăd'bèrn, **Paul Ansel,** American educator and writer: b. North Berwick, Maine, 21 Oct. 1823; d. New York 23 Feb. 1883. He was president of the Massachusetts Agricultural College at Amherst (1867–82); of the University of Wisconsin (1867–70); of Williams College (1872–81). He wrote: 'Natural Theology' (1867); 'Instinct in Animals and Men' (1872).

Chadd's Ford. See BRANDYWINE CREEK.

Chad'wick, French Ensor, American naval officer: b. Morgantown, W. Va., 29 Feb. 1844. He graduated at the United States Naval Academy in 1866, and became a captain in 1897. During the war with Spain he commanded the armored cruiser New York, the flagship of the North Atlantic squadron, and was chief-of-staff to Admiral Sampson. In October, 1900, he was appointed president of the Naval War College.

Chadwick, George Whitfield, American musician: b. Lowell, Mass., 13 Nov. 1854. He was graduated at the Leipsic Conservatory, and in 1897 became director of the New England Conservatory of Music. He has won distinction as a composer with 'Tabasco,' a comic opera; 'Jubilee,' a symphony; and 'Columbian Ode,' a chorus. Since 1897 he has conducted the annual music festival at Worcester, Mass.

Chadwick, James Read, American physician: b. Boston, Mass., 2 Nov. 1844. He graduated B.A. at Harvard 1865; M.D. 1871; and pursued further studies abroad. In 1873 he began practice in Boston, and has become distinguished as a gynecologist. He was a founder of the American Gynecological Society, its secretary 1876–82, and president 1897. A strong advocate of cremation, he has been president of the Massachusetts Cremation Society since 1894. He has contributed many important articles on his specialty to the 'Transactions' of the American Gynecological Association, the Boston 'Medical and Surgical Journal,' the 'American Journal of Obstetrics,' etc.

Chadwick, John White, American writer and Unitarian clergyman: b. Marblehead, Mass., 19 Oct. 1840. His radical sermons have

MAJOR-GENERAL ADNA R. CHAFFEE.

attracted attention, and he has been a liberal contributor to current literature. Since 1864 he has been pastor of the Second Unitarian Church in Brooklyn, N. Y. Among his works are: 'A Book of Poems,' (1875); 'The Bible of To-day' (1878); 'Origin and Destiny' (1883); 'A Daring Faith' (1885); 'The Man Jesus'; 'The Faith of Reason'; 'Old and New Unitarian Belief'; 'The Power of an Endless Life'; 'The Revolution of God'; 'Theodore Parker, Preacher and Reformer' (1900); 'George William Curtis.'

Chæronea, kĕr-ō-nē'a, a town in Bœotia, famous as the scene of several celebrated battles of antiquity. An important battle was fought near it in 447 B.C., by which the Athenians lost the supremacy in Bœotia. A still more celebrated battle was fought 338 B.C., in which Philip of Macedonia defeated the united forces of the Athenians and Bœotians, and crushed the liberties of Greece. A colossal sculptured lion was obtained by excavation on the site of this battle. In a third battle, fought at Chæronea, Sulla defeated the generals of Mithridates, 86 B.C.

Chætopoda, kē-tŏp'ō-da, an order or subclass of the class *Annelida,* recognized by the bristles (chætæ), usually four bundles to a segment. They comprise the earthworm (q.v.), certain fresh-water and numerous annelids which live in the sea, such as species of *Serpula,* as *S arenicola,* the lob-worm (q.v.), and many other genera; the most common and one of the largest American chætopods is the "clam-worm," (*Nereis virens*), which is associated with the clam of the New England coast, burrowing deeply in the mud. The marine forms undergo a metamorphosis, hatching as a top-shaped, free-swimming larva, called a trochosphere (q.v.). Some of the forms, as *Nais, Syllis, Autolycus,* etc., also multiply by a process of self-division called strobilation, and by alternation of generations. Some of them, as *Serpula* and *Spirorbis,* live in solid calcareous tubes or shells. Certain forms are luminous. The tracks of chætopod worms occur in Cambrian strata, which are so much like those made by existing forms as to show that the type has undergone little change since the Cambrian Period, which lies at the very base of the Palæozoic Age.

Chafer, chā'fẽr, the British name for a scarabeid or dung-beetle (q.v.). The larger ones, called cockchafers, are very destructive to vegetation, especially in the larval state.

Chaffee, Adna Romanza, American military officer: b. Orwell, Ohio, 14 April 1842. He received a public-school education; entered the regular army as a private, 22 July 1861; became a captain, 12 Oct. 1867; and colonel of the 8th U. S. Cavalry, 8 May 1899. On 4 May 1898, he was commissioned brigadier-general of volunteers for the war with Spain; on 8 July, following was promoted to major-general; and on 13 April 1899, was honorably discharged under this commission. On the last-mentioned date he was re-appointed a brigadier-general of volunteers, and on 19 July 1900, the President, having selected him to command the American military forces in China, commissioned him a major-general of volunteers. He reached Taku, China, on 28 July, and led the American contingent of the allied force which entered Peking on 15 August, and rescued the foreign legationers. Gen. Chaffee made a brilliant record in the Apache Indian campaigns; commanded the troops which captured El Caney, in Cuba; and afterward was chief of staff to both Gens. Brooke and Wood, when governor-general of Cuba. He has been widely known as a dashing cavalry officer, and his selection to command the American troops in China gave high satisfaction to his brother officers. On 19 June 1901, Gen. Chaffee was appointed military governor of the Philippines, to succeed Gen. MacArthur. He was relieved of this command in the autumn of 1902 and ordered to the command of the East. In 1904 he was chief of staff with the rank of lieutenant-general.

Chaf'finch, a brilliantly colored and well-known European finch, one of the most popular and most valuable cage-birds (q.v.). It is found in large numbers throughout the continent and England, and is migratory in the more northern parts, remaining, however, in England and around the Mediterranean in winter, where it is shot in great numbers for market purposes. The top of the head and nape of the neck of the male are bluish-gray, the back is chestnut, and the black wings are streaked with two conspicuous white bars. It is sought not only because of its loud, clear, and pliable voice, but because of its docility and beauty. Its voice is susceptible to training, and its value greatly increases by cultivation, the wild bird having an unpleasant and almost harsh cry. These birds sometimes have a repertoire of as many as six tunes, the words of which they sing with almost human articulation. Their training and rearing from the nest is an important industry throughout Europe, and particularly in Germany. For a full account of the powers of song of the chaffinch see Bechstein's 'Cage-Birds.'

Chagos (chā'gōs) **Archipel'ago,** a group of islands in the Indian Ocean, nearly on the same meridian as the Laccadives and Maldives, and probably a continuation of them. It extends from lat. 7° 39′ to 4° 44′ S., and lon. 70° 50′ to 72° 50′ E. The largest, called Diego Garcia or Great Chagos, 100 miles south of the main group, is about 12½ miles long by six broad, is of a crescent shape, and consists of a coral atoll covered with cocoa palms, and enclosing a lagoon which forms a harbor four miles broad. Fish abound, and excellent green turtle may be found on the shores. The islands belong to Great Britain, and form a dependency of Mauritius. Cocoanut oil is the chief product. Pigs and poultry are raised in abundance. Pop. 750.

Chagres, chā'grĕs, Colombia, a seaport on the north coast of the Isthmus of Panama, at the mouth of a river of the same name. It acquired some importance at one time as the station at which steamers landed the mails for the west coast of America, and has been frequently associated with the proposed communications between the Atlantic and the Pacific. The terminus of the railroad across the isthmus was, however, fixed at Aspinwall, about eight miles northeast, and Chagres then greatly declined. The projected Panama canal route is partly in the bed of the Chagres River.

Chaille', shä-yā, **Stanford Emerson,** American physician: b. Natchez, Miss., 9 July 1830. He graduated B.A. at Harvard in 1851, and M.D. at Tulane University in 1853, subsequently studying in Europe for three years. During 1862–3 he was medical inspector of the Confederate army in Tennessee, and later had charge of various military hospitals. He is a member of the National Board of Health, and in 1879 was president of the Havana yellow-fever commission. Since 1858 he has held various professorships in Tulane University, Louisiana, and since 1886 has been dean of the medical department, and professor of physiology, hygiene, and pathological anatomy. He is a member of numerous medical societies and boards of health, and has contributed many articles to their journals and periodicals. In addition, he has published: 'Yellow Fever in Havana and Cuba'; 'Origin and Progress of Medical Jurisprudence, 1776–1876' (1877); 'Laws of Population and Voters' (1872); 'Living, Dying, Registering, and Voting Population of Louisiana, 1868, 1874, 1875'; 'Intimidation of Voters in Louisiana' (1876). From 1857 to 1868 he was co-editor and proprietor of the New Orleans 'Medical and Surgical Journal.'

Chaille-Long, shä-yā-lôṅ, **Charles,** American explorer: b. of French parentage, Baltimore, Md., 1843. After serving in the Confederate army he went to Egypt, where he was appointed lieutenant-colonel by the khedive (1870). Gordon made him chief of staff and sent him on a mission to King Mtesa of Uganda. He has written: 'The Three Prophets' (1886); 'Central Africa' (1887); etc.

Chaillot, shä-yō, France, formerly a village on the right bank of the Seine. It boasts a considerable antiquity, being noticed in a map of the 11th century. In 1659 it became a suburb of Paris, and received the name of Faubourg de la Conférence, in memory of the conference at which the Peace of the Pyrenees was concluded. In 1786, when a wall of inclosure was built around Paris, it was included within it, and has since formed part of the western district of Paris, near the Champs Elysées.

Chaillu, Paul du. See DU CHAILLU.

Chain, in surveying, is a measure consisting of 100 links, equal to 4 rods, or 66 feet, used for measuring land. It is sometimes called Gunter's chain, from its inventor.

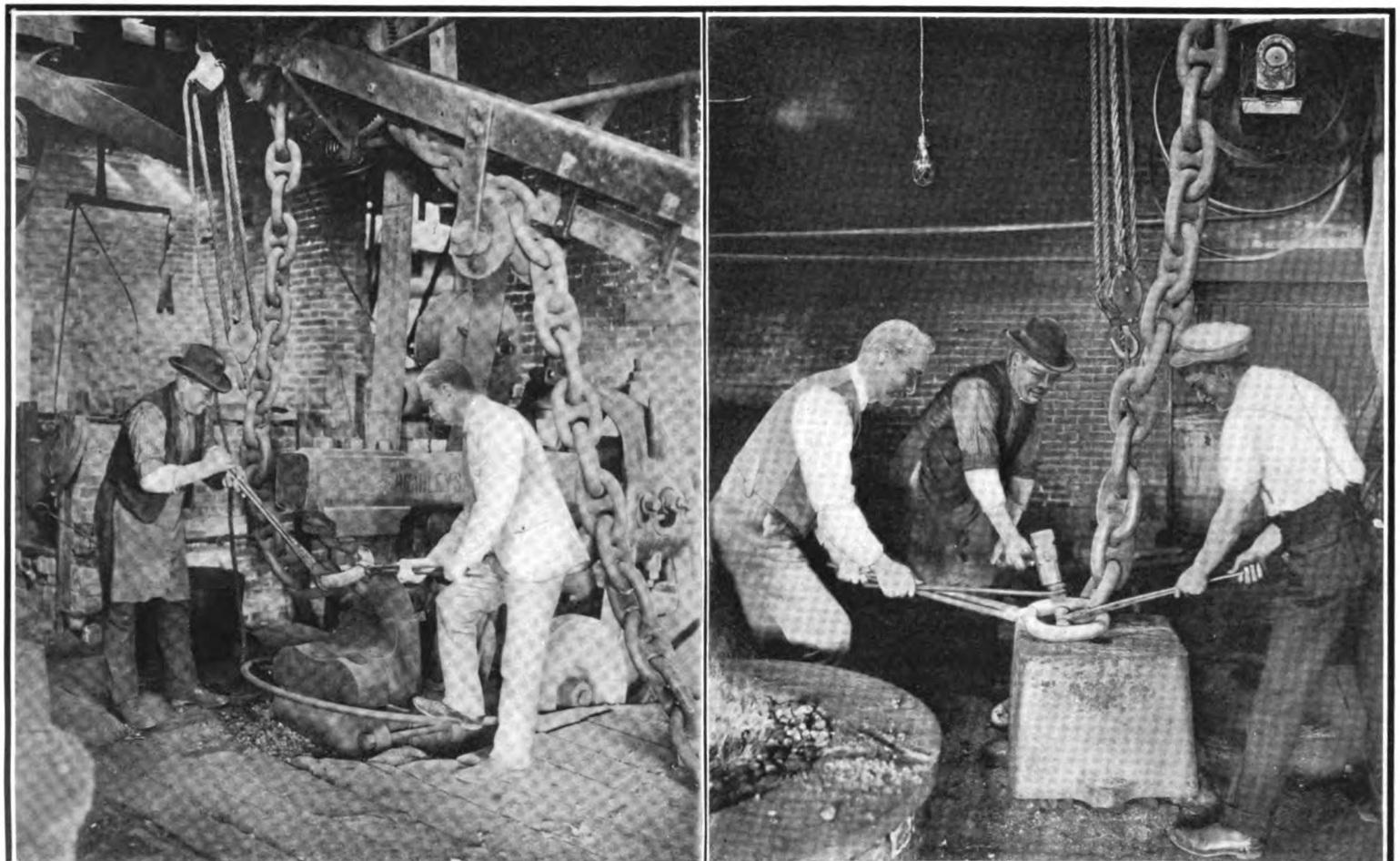
Chain-bridge. See BRIDGE.

Chain-cable. See CABLE.

Chain-making. Iron and not steel is still the favorite material from which chains are manufactured. Chain cable is employed in quarrying, for lifting heavy weights in building construction, in foundries and machine shops, or at the docks in loading and unloading vessels; while to the lumberman it is absolutely indispensable. In such work the strains are severe and sudden, the links of the chain being subjected to repeated jar and wrench due to the slipping or dropping of the material which is being hauled and lifted. It is also found performing the most important and delicate work of hauling a yacht or merchant vessel up a marine railway; while last, and most important of all, is its use as a ship's cable, where, in times of stress, a vessel costing hundreds of thousands of dollars, together with priceless human lives, may depend upon the sound quality of the material and the fidelity with which the smith has welded the chain, link by link, on his anvil.

Quality of Iron for Chain Making.— The iron used is a specially rolled grade, of high tensile strength and great ductility, the object being to secure a chain which, on the application of a sudden stress — as, for instance, when a ship is riding at anchor in a heavy seaway — will stretch and so resist the strain gradually, instead of snapping, as would be liable to happen with material of higher tensile strength but small ductility or power of elongation. Chain of from 5–16 inch up to 2 inches diameter is forged by hand, and above 2 inches it is forged with the assistance of machinery.

Hand-made Chain.— In the smaller sizes the whole operation of chain-making is done by a single smith without any helper. The length of completed chain is hung upon a hook or some convenient support near the anvil, and the operation of forging the link proceeds as follows: In his fire the smith will have two or three short rods of the required diameter, and as one is heated to, say, a cherry red, he withdraws it, cuts off the desired length for one link, gives it a couple of blows to form the welding scarf, bends it through, say, about 130 degrees, hooks it into the end of the completed chain, and brings the ends together for welding. He then raises the link to a welding heat in his fire, places the abutting ends over what is known as the bick-iron, gives it a few taps to insure a good weld, brings over a "dolly" (which is hinged at the outer end of his anvil and when brought over registers above the bick-iron), and with half a dozen blows on the dolly, accompanied with a dexterous movement of the link, the weld is completed and the link smoothed up to a neat finish. The rapidity with which the smiths do this work is very remarkable. Thus, in the case of a 7–16-inch chain, with 30 links to the yard, an expert smith will cut off from the iron bar, scarf, bend up into shape, and weld the links, at the rate of 18 yards in a day of nine working hours, which is two yards per hour, or one link per minute. In forging 1¼-inch chain the smith uses two helpers, and the iron is cut to about one-foot lengths, and several of these are being heated in the fire at the same time. The operation is as follows, the various steps succeeding each other with great rapidity: First, the helper to the right of the anvil withdraws the heated piece, drops one end into an eye at the end of the anvil, and bearing down upon the tongs, bends the piece over to an angle of about 45 degrees. The smith then takes it in his tongs, and with a few taps of the sledge it is bent around. It is heated again, passed through the end of the chain by the smith, laid flat on the anvil and the welding scarfs are put on with a few blows of the sledge. The link is now raised to a welding heat, welded by a few blows by the helpers, laid over the bick-iron, the hinged dolly is brought over, and a few rapid blows on the dolly, while the smith turns the link to and fro, serve to bring the weld up to a smooth finish. The link is now laid on edge: a single blow from the sledge brings it into shape, and with a final tap or two of the smith's hammer the link is finished. At this forge as



Bringing Scarfed Ends of Link Together Ready for Welding.

Inserting the Stud in Heavy Stud Chain.

MANUFACTURE OF HEAVY MACHINE-MADE CABLE.

many as 35 links will be added to a heavy chain of this size in one hour, or say about one every two minutes.

Machine-made Chain.— In the heavier sizes of chain of over 2 inches diameter, it becomes necessary to call in the aid of machinery in shearing the iron into lengths for the links and in bending the links into shape. The scarfs are produced by shearing the iron at an angle of 60 degrees with the axis of the bar, all cuts being taken with the inclination in the same direction, so that when the links are formed up the scarfs will lap in the desired relative position. The iron is then heated and placed in a hydraulic bending machine, where it is formed against a block into a rough U-shape at the first stroke, and then rolled into the oval link form on another block adjoining the first.. The scarfed ends are left wide enough apart to allow of the link being hooked onto the end of the chain which is being forged. The scarfed ends are now brought down snugly into contact under an automatic quick-acting hammer, and the link is heated and then welded up under the same hammer. Most of the ship cable has a cast-iron stud inserted in each link. The ends of the stud are hollow, to match the round of the chain, and when the link has been hammered down snugly into place, it is impossible for the stud to be displaced. Indeed, the pull upon the cable, by tending to straighten it out, causes the link to tighten upon the stud and hold it the more securely in place. Cables are made in standard lengths of 15 fathoms or 90 feet, and any greater length is obtained by shackling several of the 15-fathom lengths together, the average length of a ship's cable being about 90 fathoms, or 540 feet. The life of such a cable is about 10 years.

Blacking.— When the 15-fathom length is completed, it is placed in an iron box and heated by steam, and then drawn through a vat of boiling tar, known as the «tar kettle.» Here it receives a thorough coating, after which it is drawn out upon an iron grating, where the surplus tar is allowed to drain off, leaving a heavy protective coat upon the cable. In conclusion it should be noted that although each link of a chain consists of two thicknesses of bar, it must not be presumed that a chain possesses double the strength of a single bar; actually there is a reduction of three tenths in the strength, due to the formation into links, so that the chain has but about seven tenths of the united strength of two bars of the same diameter of iron. Moreover, as the strength per square inch of a heavy bar is not so great as that of a smaller diameter iron, there is further reduction to be made on this account. Thus, if a bar of ordinary rolled iron shows a breaking strength of 20 tons per square inch, the breaking strength will decrease to 19 tons up to 2 inches, and 18 tons per inch up to 3 inches diameter of rod. Consequently the breaking strength of chain made of 1-inch iron will be about 50,000 pounds, and the breaking strength of 2-inch chain about 190,000 pounds.

Chain-shot, a projectile consisting of two balls connected by a bar or a chain, formerly used for cutting and destroying the spars and rigging of an enemy's ship. It was invented by Admiral De Witt in 1666, but has long been disused.

Chain-snake, a harmless terrestrial snake, ranging from the Great Lakes to Mexico. In length it is from four to five feet, the color varying with the species. In the East and South the typical form (*Ophiobolus getulus*) is glossy black, with a chainlike pattern of yellow lines covering its back; the belly is dirty yellow, blotched with black, and the head-plates are black, spotted with yellow. A larger variety, found west of the Mississippi, is "cream-colored, sharply marked with rings of black." Chain-snakes feed upon small mammals, amphibians and reptiles, including venomous serpents.

Chain-timber, a timber of large dimensions placed in the middle of a building to give it strength. Called also bond-timber.

Chainey, George, American clergyman: b. England 1851. At first a Methodist minister, he resigned in 1877, and for the next three years was pastor of the Unitarian church in Evansville, Ind. Since then he has been chiefly engaged in lecturing and writing upon theological subjects and mysticisms, traveling through Australia and Palestine on his lecture tours. He is editor of 'The Interpreter'; and conducts a "school of interpretation." Publications: 'Foundation Stones'; 'Unitarian Sermons' (1879); 'The New Version: Discourses on the Bible' (1882); 'She: An Allegory of the Church' (1889); 'Jeanne D'Arc' (1888); 'The Ten Commandments' (1900).

Chair, an article of domestic furniture, having legs, a back, and sometimes arms; usually for the accommodation of one person. A sociable or vis-à-vis, sometimes considered as a chair, has seats for two. Among the Romans the word sella was used generically for seats of various kinds, and had usually a qualificative term appended to it, as sella curulis, sella balnearis. They had also specific names for different kinds of seats; a seat with a back, like our chairs, was called *cathedra*. Chairs were much less common, both with the ancients and in the Middle Ages, than they are in modern times; hence, perhaps, the reason why chair and *cathedra* have both given their names in an allegorical sense to various dignities. We speak of the chair of justice, and the chairman of a meeting, and *cathedra* is now most widely known by its derivative cathedral, the name still given to a metropolitan church.

Chair of St. Peter, The, a relic at Rome of which the first known mention was made by Ennodius in 500, and a feast in honor of which was instituted or restored by Paul IV. in 1558. It was exposed for public veneration by Pius IX. in 1867. It is of wood overlaid with ivory and gold.

Chaise, shāz, a two-wheeled carriage for two persons, with a calash top, and usually drawn by one horse.

Chalcedon, kăl-sē'dŏn, a city of ancient Bithynia, opposite Byzantium, at the entrance of the Euxine, about two miles south of the present site of Scutari. Chalcedon is said to have been founded before Byzantium, and was a flourishing town when it came into possession of the Romans, under the testament of Nicomedes 74 B.C., as included in the kigdom of Bithynia. It was finally destroyed by the Turks, by whom it was taken about 1075. At

Chalcedon in 451, Marcian, the emperor of the East, held the fourth general council for the purpose of destroying the ascendancy of the Monophysite doctrines obtained in 449 by the influence of the Alexandrian patriarch Dioscuros at the (so-called) robber-synod at Ephesus; and define the Christian faith so as to guard its orthodoxy against the Nestorian and Monophysite heresies. This council, which consisted of 600 bishops, mostly of the East, deposed Dioscuros, and after violent debates the articles of faith settled by them declared, in opposition to the Monophysites, the belief of two natures in Christ, existing without mixture or change, without division or separation, so that by the union of the two natures in one person and substance their distinction is not destroyed, but the characteristics of each are retained. Besides this creed the council promulgated 30 canons against clerical abuses, of which canons the twenty-eighth conceded to the see of Constantinople second rights and privileges to the Roman, but Pope Leo I. refused to confirm it. Rebellions in Palestine and Egypt were the immediate consequences of the decrees of the council of Chalcedon against Dioscuros and the Monophysites; and not till after a long period of ecclesiastical contests, during which the Monophysites were entirely separated from the orthodox and formed a distinct church, did the Chalcedon formula of faith obtain the undisputed authority which it now has in the Catholic, Greek, and many Protestant churches.

Chalcedony, kăl-sĕd'-ō-nĭ (from Chalcedon, an ancient Greek town in Asia Minor), a cryptocrystalline variety of quartz, transparent or translucent with a waxy lustre, and white, gray, blue, brown, or black in color, but commonly of a tint suggestive of diluted milk. It occurs in masses, also very frequently in mammillary, botryoidal and stalactitic forms. It is used for ornament and is often called "white agate."

Chalced'onyx, the name applied to those agates in which opaque white chalcedony alternates with the translucent gray variety.

Chalchihuitl', chăl-chī-wētl', a bluish-green mineral, highly prized by the ancient Mexicans, and identified with jadeite by some authorities, with emerald by others, and with the turquoise of the Santa Fé region by still others. The last-mentioned conjecture is probably correct.

Chalcis, kăl'sĭs, a town of Greece, in the island of Negropont or Eubœa, separated by the narrow Strait of Euripus from the mainland, with which it is connected by a bridge that opens to let vessels through. The modern town is now one of the most attractive in Greece, and consists of an inner walled town and an outer or suburban portion, the walls being the work of the Venetians. In the inner town the streets are narrow and the houses lofty. Several of the churches were formerly mosques. Ancient Chalcis was one of the greatest of the Ionic cities, carried on a large trade, and planted numerous colonies. It had also colonies on the coasts of Macedonia and Italy, in Sicily, and in the islands of the Ægean Sea. The Chalcians joined the Bœotians in a war with Athens, in which they were defeated 506 B.C. After the Persian wars Chalcis became tributary to Athens. The Chalcians revolted 445 B.C., along with the Eubœans, but were vanquished by Pericles. Another revolt occurred 411 B.C., and Chalcis for a short time became independent. A bridge was at this time built across the Euripus, and fortified; a passage sufficient for a single ship being left in the middle. It was subsequently occupied by the Macedonians, and after various vicissitudes fell under the yoke of the Romans. Chalcis joined the Achæans in their last war with Rome, when the city was taken and destroyed by Mummius. It was afterward rebuilt, and about the beginning of the Christian era was the chief city of Eubœa. It was held by the Venetians from 1210 to 1470, when it was taken by the Turks. Pop. about 10,000.

Chalcis (kăl'sĭs) **Flies,** a family (*Chalcididæ*) of parasitic *Hymenoptera,* allied to the ichneumon flies, and with similar habits. The fore wings are nearly veinless; the posterior margin of the prothorax not reaching the tegulæ; while the ovipositor issues from before the end of the abdomen. The chalcids are generally minute, a few almost microscopic; many of them of beautiful shades of green, with metallic reflections. A goodly proportion of them are secondary parasites, that is, are parasitic on other chalcids; some deposit their eggs in galls. Typical genera are *Pteromalus* (*P. puparum*), *Semiotellus,* and *Chalcis. Eurytoma hordei* is the wheat joint-worm, not being carnivorous or parasitic in other insects. Our largest chalcid is *Leucospis affinis.* Aside from the immense benefit these chalcid flies confer on agriculture by destroying noxious caterpillars, etc., the fig insect (*Blastophaga grossorum*) is the agent in enhancing the value and flavor of figs. See CAPRIFICATION.

Chalcocite, kăl'-kō-sīt (χαλκός, "copper"), a native sulphide of copper having the formula Cu_2S. It crystallizes in the orthorhombic system, and also occurs in massive and granular forms. It has a hardness of from 2.5 to 3, and a specific gravity of from 5.5 to 5.8. It is opaque and leaden in color, with a metallic lustre. In the United States it occurs in crystals at Bristol, Conn., massive as the principal copper ore at Butte, Montana, and similarly in many copper mines in Arizona; also in Mexico, Chile, and Peru. Beautiful crystals come from Cornwall, England, and one crystal, found in Tuscany, weighs half a pound. It contains 80 per cent of copper and is known also as "copper-glance," "chalcosin," and "redruthite."

Chalcondylas, kăl-kŏn'dĭ-lăs, **Deme'trius,** Greek grammarian: b. Athens about 1424; d. Milan 1511. He was a pupil of Theodore Gaza, and on the taking of Constantinople by the Turks came to Italy, where he taught the Greek language, was invited to Florence by Lorenzo di Medici about 1479, and proceeded afterward on the invitation of Lŭdovico Sforza, to Milan. He spread the study of the Greek language and literature in the west of Europe, and sent out several celebrated scholars. Among the works edited by him was 'Homer' (1488); 'Isocrates' (1493); and 'Suidas' (1499). He also compiled a Greek grammar, which was long in general use as a school-book. In his editions of the Greek authors he was somewhat arbitrary in his emendations of the text. His brother Laonicus, after witnessing the fall of Constantinople, followed his brother to Italy. He is the author of

a history of the last years of the Byzantine empire, from 1297 to 1462.

Chalcondylas, Laon'icus, Greek historian: b. Athens; d. about 1464. He was a brother of Demetrius Chalcondylas (q.v.). He was an ambassador of John VII. during the siege of Constantinople, and wrote a 'History of the Byzantine Empire 1297–1462.'

Chalcopyrite, kăl-kō-pī'rīt (Gr. Χαλκός "copper" pyrites), a native sulphide of copper and iron, having the formula $Cu_2S.Fe_2S_3$, and crystallizing in the tetragonal system, commonly with a tetrahedral aspect. Chalcopyrite is brass-like in appearance, and is often tarnished and iridescent. It has a specific gravity of about 4.2, and a hardness of from 3.5 to 4. It is widely distributed, and in Cornwall, England, it constitutes the chief ore of copper. It occurs in many parts of the United States also. Owing to the iridescence noted above, it is often called "peacock ore." It is softer and deeper in color than ordinary iron pyrites, with which it is sometimes confused.

Chaldæa, kăl-dē'ạ, in ancient geography, the southerly part of Babylonia, toward Arabia and the Persian Gulf, lying west of the mouth of the Tigris and Euphrates. The Chaldæans are supposed to have been at first a wandering and predatory race like the Arabs, who afterward became settled, and ultimately gave their name to Babylon and the Babylonian empire. The name Chaldæan was especially applied to a portion of the Babylonian Magi, who were devoted to the pursuit of astronomy and magical science.

Chaldæan (kăl-dē'ạn) **Christians,** a branch of the Nestorians, in communion with the Roman Catholic Church.

Chaldean MS., The, an extraordinary satire, now almost forgotten save by special students of literature. It was a skit at the expense of the publisher Constable, and of the Edinburgh notables specially interested in the Whig 'Edinburgh Review'; prepared by the editors for the seventh number of the new Tory 'Blackwood's Magazine,' October 1817. In form it was a biblical narrative in four chapters, attacking Constable, and describing many of the Constable clientage with more or less felicitous phrases. Many of its characterizations cannot now be identified, but they were all scathing and many of them mean. The joke was perpetrated by James Hogg, the "Ettrick Shepherd," whose original paper was greatly enlarged and modified by Wilson ("Christopher North") and Lockhart. The satire, which now seems so harmless, shook the old city to its foundations, and led to many lawsuits. Originally it was headed 'Translation from an Ancient Chaldee Manuscript,' and pretended to be derived by an eminent Orientalist from an original preserved in the great library of Paris.

Chaldee (kăl'dē) **Language,** a form or dialect of the Aramean, one of the three principal varieties of the ancient Semitic. The region called in Scripture Aram may be described generally as occupying the northern and northeastern divisions of that corner of Asia which was the home of the Semitic languages. It was bounded on the north by the Taurus range and the river Tigris, which latter also formed its eastern boundary; on the west by the Mediterranean and Mount Lebanon; and on the south by Palestine and the Arabian desert. The Aramean language was very extensively known, not only within the limits above mentioned, but beyond them. The princes of Judea and Assyria were familiar with it; it was spoken in the palace of Nebuchadrezzar, and even formed the medium of communication between the Persian court and its subjects in Judea and Samaria. It may also lay claim to a high antiquity, being probably the language of Abraham previous to his migration into Palestine, and certainly of his grand-nephew Laban. Unfortunately the older monuments of the language have perished, the Chaldee portions of Daniel and Ezra being the earliest specimens we possess of a language which had probably existed and flourished at least 2,000 years before. There is another dialect of the Aramean besides the Chaldee, namely, the Syriac, and in this as well as in the Chaldee numerous writings are still extant, but they are all of comparatively recent date. The Chaldee literature is usually arranged in two divisions: the biblical Chaldee, or those portions of the Old Testament which are written in Chaldee, namely, Daniel from ii. 4 to vii. 28; Ezra iv. 8 to vi. 18, and vii. 12–26; and Jeremiah x. 11; and the Chaldee of the Targums and other later Jewish writings. The former is distinguished by a closer approach to the Hebrew idiom, and is therefore considered less pure than the Chaldee of the Targum of Onkelos, the oldest and most valuable of the Targums.

Chalder, chäl'dėr, an obsolete Scotch dry measure containing 16 bolls or 12 imperial quarters.

Chal'dron, an English measure of 36 bushels, used chiefly in measuring coal.

Châlet, shă-lā' ("a little castle"), the wooden hut of the Swiss mountain herdsman; a French-Swiss name, which is also extended to Swiss houses generally, as well as to ornate and picturesque villas built in similar style.

Chaleur Bay, shạ-lėr, or **Bay of Chaleurs,** an inlet or arm of the sea in the Gulf of St. Lawrence, between Quebec and New Brunswick. The French fleet was here defeated by the British in 1760. There are a number of islands in this bay, notably Shippegan, near its mouth. The navigation is good and the mackerel fishery is important.

Chalice, chăl'ĭs (Latin, *calix*), a cup or bowl. This term, originally signifying a common drinking vessel, is now usually applied to a communion cup. From wood or other cheap material in early times, chalices came to be made of glass, agate, silver, and gold, with engraving, enamel, and different kinds of costly decoration. Some of them have great historic interest and value, and are preserved in church treasuries and various museums of Europe. It is generally held that a chalice must have a knop or ball in the middle of the stem or foot which supports the bowl. This is intended to secure the hold of the person who hands it to the communicant. It has also a cover which may be the paten or dish for the consecrated bread. When the Protestant separation took place in England, the communion-cup was made of a wholly different pattern from the chalice.

Chalicotherium, kăl''ĭ-kō-thē'rĭ-ŭm, or **Macrotherium,** măk-rō-thē'rĭ-ŭm, an extinct

ungulate of the Miocene Epoch, as large as a rhinoceros, but hornless and with enormous claws on the toes of both fore and hind feet,—a character almost unique among the *Ungulata.* The animal was distantly related to the *Titanotherium* (q.v.), but is usually placed in a distinct sub-order, the *Ancylopoda.* The foot-bones, when first found, were supposed to belong to an animal related to the *Edentata* (sloths, ant-eaters, and armadillos), and was described by Cuvier as a *pangolin gigantesque;* but the discovery of a complete skeleton (preserved in the Museum of the Jardin des Plantes, Paris), showed its true relationships.

Chalk'. In geology chalk is a soft, friable, finely granular variety of limestone, and may in color range from pure white to grayish or buff. It is a marine deposit, composed principally of the shells of foraminifera. In the United States are some great beds of chalk of Upper Cretaceous Age. One is exposed for 250 miles from Austin to Sherman, Texas, and is nowhere much less than 600 feet thick. Chalk beds of the same age, Colorado stage, are found in Arkansas, Kansas, and in Montana, while the great chalk belt of Texas extends southwest from Austin into Mexico, being found in the states of Chihuahua, Coahuila, and Tamulipas. In Arkansas and Texas this chalk formation and its associated chalky marls is being developed as furnishing excellent material for making Portland cement. No statistics of the amount thus used at present are available. In England the Upper Cretaceous series is marked by great beds of chalk and chalky limestones, and includes the Cenomanian, Turomain, and Senonian stages. Such strata extend across England from Flamborough Head on the east coast to west of Dover on the south coast. The chalk-mining industry of England is of importance, the toal amount of chalk produced in 1901 being 4,399,000 tons. Part was used for cement-making and part for making refined chalk. (See CEMENT; CRETACEOUS SYSTEM.) 'United States Geological Survey Report, 1900–1,' Part III.; 'The Chalk of Northwestern Arkansas.'

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Of the United States Geological Survey.

Chalk, Red, or **Reddle,** a red, amorphous variety of hematite or sesqui-oxide of iron, containing much clay. To this fact it owes its firm, compact texture. It has an ocher-red color and is used chiefly by carpenters for making marks on wood, and by tailors for marking on cloth; the finer, by painters. It occurs in thin beds in clay-slate and gray wacke-slate in parts of Germany.

Chalkley, châk'lĭ, **Thomas,** American Quaker itinerant preacher: b. London 3 March 1675; d. Tortola, West Indies, 4 Sept. 1741. He spent his life preaching in New England and the Southern colonies; toward its end he made his home near Philadelphia. His chief work was his 'Life, Labors, and Travels,' whose quaintness made it popular even outside the Society of Friends, and has caused it to be several times reprinted.

Challemel-Lacour, Paul Armand, pōl ärmäñ shäl-mĕl-lä-koor, French statesman: b. Avranches 19 May 1827; d. Paris 26 Oct. 1896. He was graduated at the École Normale in 1849 and soon fell under the ban of political proscription. He was elected to the French Chambers, however, and served the republic as senator, ambassador to Switzerland from 1874 to 1879, ambassador to England from 1880 to 1882, Minister of Foreign Affairs and president of the Senate in 1888. He was elected to the French Academy in 1893, and was editor of the 'Republique Française.'

Chal'lenge, originally, an accusation, charge, or claim. A challenge to jurors is an objection either to the whole panel or array, that is, the whole body of jurors returned, or to the polls, that is, to the jurors individually; and it is either peremptory, that is, without assigning any reason, or for cause assigned. A peremptory challenge is allowed to be made only by the party accused, and not by the government or prosecuting officer, and only in capital cases; and is said to be permitted on the ground that a man is liable to conceive a prejudice against another from his mere looks and appearance, for which he can give no reason: and such may be the case of the accused; and it is conceded, in favor of life, that in such case he may exclude the juror without assigning any reason; and also on the ground that, by questioning a juror as to any objection to him, his prejudice may be thereby excited against the prisoner, who, to save himself from the effect of such prejudice, is permitted to have him rejected. The ground on which peremptory challenge is allowed supposes the prisoner's life to be in danger, and he is not entitled to it if he pleads in bar or abatement; for the trial of these pleas does not decide on his life. He must, before making such challenge, plead "not guilty," or some plea the trial of which decides on his life. Having pleaded such a plea, the accused might, by the common law, peremptorily challenge 35 jurors; but the statute 22 Hen. VIII. c. 14 limited the number to 20 in felony. The regulating statute now in force in Great Britain is 6 Geo. IV. c. 1. By the law of the United States a peremptory challenge of 35 jurors is allowed in trials for treason, and 20 in those cases of felony mentioned in the statute. A challenge of the whole panel may be made because the jury is illegally drawn or summoned, whereby it is not a legal jury; and a challenge of this description may be made by the government as well as by the prisoner. Challenge to the polls may be made both in civil and criminal suits for cause, as that the juror is an alien, not from the proper district, not duly qualified as a freeholder, not of suitable age, etc., or is near of kin to one of the parties, is biased, has been guilty of felony, is interested, or is subject to any other exception, according to the common principles of proceeding or the provisions of any statute on the subject. In courts-martial a prisoner who objects to either of the judges must assign his reasons. In other words peremptory challenges are not allowed in these courts. The privilege of challenging here belongs equally to the prisoner and the prosecutor. The right of challenging the members of a court-martial prevails on the continent of Europe, as well as in England and America.

A challenge to fight a duel is punishable in England with fine and imprisonment. In several of the United States of America this offense

is subject to the additional punishment of ineligibility to any public office, either for life or for a limited term. See DUEL.

Chal'lenger Expedition, an expedition conducted in 1872–6, under the auspices of the British government, for the purpose of exploring the open ocean. The Challenger was fitted with everything that could be carried in the way of appliances for scientific research, and placed in command of Capt Nares. Prof. Wyville Thomson and scientific staff conducted the investigations and determined the depths of waters, the configuration and condition of the sea-floor, the fauna, the currents, atmospheric conditions, etc. During the three and a half years they covered nearly 70,000 nautical miles. The route was south to Madeira, thence to the Canaries, the West Indies, and north as far as Nova Scotia; south again to Cape Verde, then to Cape of Good Hope, Australia, the China Sea, Japan, the west coast of South America, through the Straits of Magellan, and back to England. The narrative of the expedition is told in popular form in Moseley's 'A Naturalist on the Challenger.' A complete account of the scientific results was gradually published in 50 splendid volumes, by Wyville Thomson and Dr. John Murray.

Chal'lis, James, English astronomer: b. Braintree, Essex, 12 Dec. 1803; d. Cambridge 3 Dec. 1882. In 1836 he was elected Plumian professor of astronomy at Cambridge and director of the observatory. In 1861 he was succeeded in the latter position by Adams, but retained the professorship of astronomy till his death. He is best known for his work upon the theory of astronomical instruments, and for his observations in connection with the discovery of the planet Neptune.

Chal'loner, Richard, English Roman Catholic bishop: b. Lewes, England, 29 Sept. 1691; d. London 12 Jan. 1781. His parents were Protestant dissenters from the established religion of England. After the death of his father young Challoner came under other influences and was received into the Catholic Church. At the age of 13 years he entered the English college at Douai in France and there, after completing his studies, was ordained priest and appointed professor of divinity. He remained in this station till 1730, when he was sent on the English mission with London as his field. He wrote many controversial tractates and many devotional manuals. Among his writings is 'The Catholic Christian Instructed,' a sort of advance catechism of the Roman Catholic faith, in the preface to which he made an ingenious and spirited reply to Dr. Middleton's famous 'Letter from Rome, Showing an Exact Conformity Between Popery and Paganism.' Middleton, smarting from the keenness of Challoner's controversial weapons, invoked against his adversary the penalties prescribed by the penal laws enacted for the extermination of the Roman Catholic religion. In 1741 Challoner was consecrated bishop and made coadjutor to the bishop in charge of the "London District," for the assumption of a see-title in England by a Roman Catholic bishop was a penal offense. Besides the work already mentioned, Challoner wrote the devotional work, 'Garden of the Soul,' which is still in general use among Roman Catholics as a prayer-book. He wrote also, in two volumes, 'Memoirs of Missionary Priests and Other Catholics of both Sexes Who Suffered Death or Imprisonment in England on Account of Their Religion, from the Year 1577 till the End of the Reign of Charles II.'; also 'Britannia Sancta,' lives of English, Scotch and Irish saints. He revised the Douai-Rheims English version of the Old and New Testaments, improving and modernizing the style.

Chalmers, chä'mėrz or chăl'merz, **Alexander,** English journalist, editor, and miscellaneous writer: b. Aberdeen 29 March 1759; d. London 10 Dec. 1834. He received a good classical and medical education in his native city, where his father, the founder of the first Aberdeen newspaper, was a printer. About 1777 Chalmers went to London, and was employed as a contributor to the *St. James' Chronicle,* the *Morning Chronicle,* the *Morning Herald,* and various critical magazines and reviews. He edited numerous editions of the English classics, particularly the 'British Essayist' (45 vols. 12mo 1803), commencing with the 'Tatler,' and ending with the 'Observer,' together with prefaces, histories, and biographies; the 'Spectator'; 'Tatler'; and 'Guardian' (12 vols. 8vo 1822); an edition of Shakespeare, with historical and explanatory notes, in 1809; 'The English Poets from Chaucer to Cowper,' with Johnson's 'Lives,' and additional 'Lives' by Chalmers (21 vols. royal 8vo 1810). The most important and valuable of Chalmers' extensive literary labors, however, was the 'General Biographical Dictionary' (32 vols. 8vo 1812–17), the fullest body of biographical information published up to his time in England, and which has rendered invaluable service to subsequent compilers. Chalmers was as much distinguished for painstaking accuracy as an editor, combining patient and intelligent investigation of facts with literary discrimination, as for the industry which enabled him to accomplish so large an amount of work.

Chalmers, George, Scottish antiquary: b. Fochabers, Elginshire, 1742; d. 31 May 1825. Having studied law at Edinburgh, he removed to America, where he practised that profession for upward of 10 years, till the colonies declared themselves independent. Chalmers being a keen Loyalist, returned to Great Britain, where he was in 1786 appointed to the office of clerk to the Board of Trade.

Previous to his appointment he had published 'Political Annals of the United Colonies' (1780); 'Estimate of the Comparative Strength of Great Britain During the Present and Four Preceding Reigns' (1782); and 'Opinions on Interesting Subjects of Public Law and Commercial Policy, Arising from American Independence' (1784). In 1790 he published his life of Daniel Defoe; in 1794 his life of Thomas Ruddiman (a very curious book); in 1800 he edited the works of Allan Ramsay, with an elaborate memoir of the poet; in 1805 the works of Sir James Stewart of Coltness, also with a life prefixed; and in 1806 the writings of Sir David Lindsay of the Mount. The first volume of his 'Caledonia' (1807), in quarto, displayed a vast extent of erudition and research. It professes to be an account, historical and topographical, of North Britain, from the most ancient to the present times; and the original intention of the author was, that it should be completed

in 4 volumes 4to, each containing nearly 1,000 pages. Chalmers left the remainder of his great work nearly ready for the press; and it was subsequently published complete, with numerous annotations. He also wrote a 'Chronological Account of Commerce and Coinage in Great Britain' (1810).

Chalmers, George Paul, Scottish painter: b. Montrose 1833; d. Edinburgh 28 Feb. 1878. After serving in succession under a surgeon and a ship-chandler, he went to Edinburgh in 1853 in order to become an artist. He was elected an Associate of the Royal Scottish Academy in 1867, and four years later was elected to full membership. His pictures, which are characterized by rich coloring, consist mainly of portraits and subjects, though during his later years he produced several landscapes. The most important are the 'Favorite Air' (1864); 'End of the Harvest' (1873); 'Running Water' (1875); 'Threescore Years and Ten' (1875); 'Prayer' (1876); 'Knitting' (1876); and 'The Legend' (unfinished).

Chalmers, Thomas, Scottish clergyman: b. Anstruther Easter, Fifeshire, 17 March 1780; d. Edinburgh 30 May 1847. At the age of 12 he was sent to the University of St. Andrews, for the purpose of studying for the Church, and after passing through a curriculum there seven years, was licensed as a preacher in July 1799, the rule of the Scottish Church requiring that a licentiate shall have reached the age of 21 being dispensed with in his case, in virtue of the exceptional clause in favor of those possessing "rare and singular qualities."

In May 1803 he was presented to the parish of Kilmany, in the northeast of Fifeshire, and opened classes of his own for teaching mathematics in the town of St. Andrews. These were so successful that he commenced a class in chemistry also, his lectures on and demonstrations in which created quite a sensation. About this time his views as to the obligations of a Christian pastor were very different from what he was subsequently led to entertain, and he deemed it a sufficient fulfilment of these to return to Kilmany on the Saturday evenings, and from thence back to St. Andrews on the Monday mornings, devoting the bulk of his time to scientific pursuits. In 1808 he published an 'Inquiry into the Extent and Stability of National Resources,' the object of which was to show that the Berlin decree would not touch the real foundations of the prosperity of Great Britain.

In 1813 his article on Christianity appeared in the Edinburgh 'Encyclopædia,' and shortly afterward his review of Cuvier's 'Essay on the Theory of the Earth,' in the 'Christian Instructor.' In this last he propounded the interpretation of the first verses of Genesis, afterward adopted by Dr. Buckland, with a view to make the truths of revelation and the discoveries of geological science harmonize. In his lectures at St. Andrews in 1803 he had already said, "The writings of Moses do not fix the antiquity of the globe. If they fix anything at all, it is only the antiquity of the species." His fame as a preacher had by this time extended itself throughout Scotland, and a vacancy having occurred in the Tron Church of Glasgow, he was elected to the charge by a large majority of the town-council, and inducted on 21 July 1815. In the month of November following he commenced his series of astronomical discourses, in accordance with a custom observed in Glasgow, of the city ministers delivering in rotation a course of sermons in the Tron Church on Thursdays. These created a sensation such as no sermons had ever before produced in Glasgow. It is related, that when the hour of delivering them arrived, merchants and men of business would regularly leave their desks and proceed to the Tron Church, while the more liberal among them would, in addition, grant a similar indulgence to their clerks and assistants. In the commencement of 1817 these discourses were published, and attained a sale of nearly 20,000 copies by the end of the year. They raised their author to the position of the first preacher of the day, and in a visit which he shortly afterward paid to London, the most distinguished literati and statesmen crowded to listen to the wondrous oratory of the Scottish divine.

The main object which engaged Chalmers on his arrival in Glasgow was the reorganizing of the parochial system, so as to provide a machinery by which the destitute and outcast might be visited and reclaimed, and the young instructed in the lessons and duties of religion. Especial efforts were directed toward the establishment of Sabbath-schools. Great exertions were also made by him to get new churches erected throughout Glasgow, the church accommodation for which comprehended scarcely a third of the inhabitants. In this he ultimately succeeded, and in addition, a new parish and church (St. John's) were erected and endowed expressly for himself by the town-council of Glasgow. To this he was in 1819 transferred from the Tron. The fatigues, however, which unremitting attention to parochial affairs involved were becoming too much for his health, and on the vacant chair of moral philosophy, in the University of St. Andrews, being offered to him, he accepted it.

In 1827 the divinity chair in the University of Edinburgh became vacant, and Chalmers was unanimously elected to it by the town-council 31 October. This appointment he held till the disruption of the Scottish Church in 1843. In 1832 he published his 'Political Economy,' and shortly afterward appeared his contribution to the celebrated Bridgewater Treatises, 'On the Adaptation of External Nature to the Moral and Intellectual Constitution of Man.' In 1834 he was elected a corresponding member of the Royal Institute of France. An important matter which now largely engaged his attention was the subject of church extension, which he had zealously advocated from the days of his ministry in Glasgow. But Lord Melbourne's government was little disposed to aid the Church of Scotland on this occasion, and it was consequently obliged to carry out its scheme on the voluntary principle. Amid the various public movements with which Chalmers' name stands connected, there is none in which it more prominently occurs than in relation to the great non-intrusion movement in the Scottish Church. Throughout the whole of this memorable contest, from the passing of the veto law by the General Assembly to the Disruption in 1843, he acted as the leader of the Evangelical party in their struggles with the civil power, and may be regarded as the founder of the Free Church, of the first assembly of which he was

moderator. He was also the originator of the sustentation fund, out of which the ministers of that body are principally supported. Having vacated at the Disruption his professorial chair in the Edinburgh University, he was appointed, on the establishment of a new college in connection with the Free Church, to the offices of principal and primarius professor of divinity in that institution. The energy which made Chalmers remarkable as an orator was infused into all his practical undertakings; and in the social and religious movements which he inaugurated he has left his mark in the history of his country. His published works are very numerous, embracing sermons, tracts, essays, works on political economy, the parochial system, church establishments, etc. They exhibit the same energy of conviction, together with a breadth and profundity of view, which, though many of his theories have not been accepted by other thinkers, will always make them a rich mine of suggestion and instruction to inquirers into the complicated relations of human society. See 'Lives,' by Hanna (1849–52); Fraser (1881); Mrs. Oliphant (1893); Blaikee (1897).

Châlons-sur-Marne, shä-lôṅ sür märn, France, a city and capital of the department Marne (Champagne), 107 miles east of Paris. It lies on the right bank of the Marne, here crossed by a stone bridge of three arches, built in 1787. Low walls now supply the place of the old ramparts, the entrance being by six gates, which open to six main roads. The principal public buildings are the cathedral, restored by Louis XIV. after having been destroyed by fire in the 13th century; the church of Notre Dame, of the 12th and 13th centuries, and since restored; the Hotel de Ville, built in 1772; the Hotel de la Prefecture, built in 1764, one of the finest buildings of the kind in France; public library, containing 30,000 volumes; museum, hospital, etc. There is a promenade, occupying about 18 acres, formerly planted with superb elm trees, which the Germans cut down for fuel during the Franco-Prussian War. Châlons is the seat of a bishopric, and of one of the schools of arts and trades, where 300 pupils are maintained and instructed at the public expense. There are manufactures of woolen and cotton goods; cotton mills, tanneries, etc. Châlons was fortified and embellished by the Romans. Christianity was preached here about the year 250. In 451 Attila was defeated before its walls. From the 10th century it formed a kind of independent state, governed by its bishops, till 1360, when it was united to the crown. A celebrated camp was established by Napoleon III. at the distance of about 18 miles from Châlons for the purpose of training the French troops. In 1870 the town was occupied by the Germans after MacMahon's withdrawal. Pop. (1903) about 27,000.

Châlon-sur-Saône, sür sōn, France, a town in the department of Saône-et-Loir, 33 miles north of Macon, at the commencement of the Canal du Centre. It is situated on the Saône, here crossed by a bridge of five arches, communicating with the suburb of St. Laurent. It is irregularly built, and is surrounded by a wall and the remains of ancient fortifications. The public buildings include the church of St. Vincent, built in 1386–1440, a library with 22,000 volumes, a gallery of painting, etc. Châlon is the seat of a tribunal of first resort and of commerce, and has a communal college. There are foundries, dye-works, manufactories of leather, cloth, glass, etc., and a considerable trade in grain, flour, and wines. The Saône becomes navigable for steamboats here, and there is steamer connection with Lyons. Cæsar had grain magazines at Châlon, and it became the capital of Burgundy under Gontran. In 1273 Edward I. of England, being invited to a tournament here on his return from Palestine, attended with 1,000 men-at-arms; and some disputes having arisen, the English attacked the French, killed a great number, and left the tilting-ground strewed with the dead. This event is known as "the little war of Châlon." The town suffered considerably from the civil wars of the 15th and 16th centuries, and from the invasion of the allies in 1814. Pop. (1896) 26,630.

Chalybeate (kạ-līb'ē-āt) **Waters,** those which contain salts of iron in sufficient quantity to give them a special value in the treatment of cases of anæmia, etc. Iron or steel waters are not the only mineral waters in which some form of iron is found. Indeed in nearly all this ingredient exists, but in very many in such small quantity, while other ingredients are so conspicuous, that the character of the water can hardly be supposed to be affected by that metal. Those springs most successfully resorted to contain from one third to nine tenths of a grain of iron, in the form of carbonate, in 16 ounces. Some springs are classed as iron springs which contain barely one fifth of a grain in 16 ounces of water. What are called pure iron springs are those which contain but a few grains of dissolved solids, a salt of iron existing to some appreciable amount; compound iron springs contain moderate quantities of other salts, such as Epsom and Glauber's salts, common salt, sulphate of lime, besides being rich in carbonic acid gas. The reason for the use of iron waters is that iron is a necessary ingredient of the blood, and in certain conditions promotes the formation of blood. Small doses only should be employed, as excess may irritate the stomach and bowels and produce constipation. It has been found that iron springs are most useful in cases of poverty of blood quickly produced, for example, by loss of blood by bleeding from the nose, or from wounds; by drain occurring from the blood, owing to diarrhœa, suppuration, and other profuse discharges; in cases of chlorosis in young girls; and in poverty of blood dependent on acute disease, in which cases they materially promote convalescence. Iron springs are also used in disorders of menstruation, especially in its suppression; in malarious conditions and poverty of blood due to residence in tropical countries; and in neuralgia, sterility, and impotency due to enfeebled conditions of general health. In such cases as these last the improvement is not so rapid, and is often best promoted by waters which, besides the iron, contain marked quantities of other ingredients, like common salt. It is chiefly in the form of carbonate that the iron exists, and this is the best form for administration. The presence of carbonic acid gas in the water keeps the carbonate of iron in solution, and when the water

stands a yellowish rust is deposited. Iron springs are used for bathing, but it is not now believed that the iron produces any effect on the skin or is absorbed from the bath. Among the chief chalybeate springs are those at Saratoga, N. Y.; two at Harrogate, England, called the Muspratt and the Tewitt, the latter pure; a pure one at Tunbridge Wells; several at Bath; one at Bocklet, near the salt spring of Kissingen, containing much common salt and carbonic acid gas; those of Antogast, Freiersbach, Griesbach, Petersthal, and Rippoldsau, in the Black Forest region, at altitudes of from 1,280 to 1,886 feet; one at Orrezza, in Corsica, with much carbon dioxide and traces of arsenic; many at Spa; one at St. Moritz, Switzerland, situated at an elevation of 5,710 feet; one at Santa Catarina, Italy, three miles from Bormio, at a height of 5,600 feet; several very popular pure ones at Schwalbach in Nassau; one at Pyrmont, Waldeck; and one at Cheltenham, with a very high proportion of iron carbonate.

Chalybite, kăl'ĭ-bīt, or **Siderite,** a common iron ore. It is iron protocarbonate, $FeCO_3$, containing 48.2 per cent of metallic iron. It occurs in rhombohedral crystals, also botryoidal, globular, compact or earthy, but most commonly cleavable-massive. Its hardness is 3.5 to 4, but in the siliceous variety, clay iron-stone, found in many coal formations, it sometimes runs up to 7. Its specific gravity is about 3.85, lustre vitreous to pearly, color usually brown or yellowish-gray. It is generally nearly opaque. It occurs in enormous quantities in Austria, also at Roxbury, Conn. It is a frequent associate of silver, lead, and copper ores. Clay iron-stone is considered the most important iron ore of England.

Cham, shăn (pseudonym of AMÉDÉE DE NOÉ), French caricaturist: b. Paris 26 Jan. 1819; d. 6 Sept. 1879. He adopted the name Cham (Ham) as one of the sons of Noah, his father being M. de Noé (Noah). The son of a peer of France, he attended the polytechnic school; but following his artistic inclinations, became a pupil of Delaroche and Charlet, and acquired distinction as a caricaturist by his spirited and humorous contributions to the Paris 'Charivari,' and by the publication of several collections of caricatures, among the best of which are 'Annee's Comiques' (1880); 'Les Folies Parisennes' (1883).

Chama, kā'mą, a genus of mollusks, the typical one of the family *Chamidæ*. The shell has foliaceous valves, the upper one the smaller, one valve attached to another body by the left umbo; the hinge tooth of the free valve is received between two teeth of the other. The chamas are found less than 50 fathoms deep in tropical seas, especially among coral reefs. Fifty recent species are known, and 40 fossil, the latter from the Cretaceous onward. The still existing *Chama gigas* sometimes weighs 300 pounds, and may measure four feet across. The byssus by which it adheres to the rock is so tough that a hatchet is required to cut it through. One valve is sometimes used in churches as a baptismal font.

Chamærops, ką-mē'rŏps, a genus of palms established by Linnæus, and remarkable as containing those species of the palm family which are found at the greatest distance from the equator. It is characterized by its flabelliform leaves, polygamous and sometimes dicœcious flowers, and its triple monospermous drupes. The *C. humilis* is the only palm which is seen growing in the open air in any part of Europe. It is confined, however, to its hottest parts, and even there is generally only from four to five feet high. Its trunk, from five to six inches in diameter, is closely covered with triangular hard scales, the bases of the old leaves; the new leaves grow in a tuft at the top. Sometimes the stem does not appear at all; and the leaves, apparently issuing from the ground in the form of a large fan, have procured for the plant the name of the fan-palm. In hothouses the stem attains the height of 15 feet or more. The leaves are used for thatch and other purposes, and they furnish a large quantity of fibre, which forms an article of commerce and yields a material that may be used instead of horse-hair. *C. fortunei,* a species from northern China, stands the climate of southern England quite well. Brazilian grass is a fibre obtained from *C. argentea.*

Chamalari, chä-mä-lä'rē, or **Chamalhari,** a peak of the Himalaya Mountains, at the western extremity of the boundary line between Bhutan and Tibet. Height, 23,929 feet.

Chamba, chăm'bą, a state of the Punjab district, British India, north of the districts of Kangra and Gurdaspur; area 3,216 square miles. It is a mountainous tract, shut in on almost every side and traversed by two hill-ranges. The crops consist of all kinds of grain and the supply of iron and slate is plentiful. The sanitarium of Dalhousie is in this district. Pop. 130,000.

Chambal, chŭm'bŭl, a river in Rajputana, Central Provinces of British India, flowing into the Jumna; length, 750 miles.

Cham'ber, a term having various technical meanings. The chamber of a cannon is that part of the bore of a cannon which receives the powder with which it is charged. The chamber of a mine is the place where the charge of powder is lodged that is to be used for blowing up the works. In several languages chamber is used to designate a branch of government whose members assemble in a common apartment. A chamber of commerce is a board or association to promote the interests of the trade and merchandise. See CHAMBERS OF COMMERCE.

Chamberlain, Abiram, American governor: b. Colebrook, Conn., 7 Dec. 1837. He was educated in the public schools and at Williston Seminary, Easthampton, Mass., making a special study of civil engineering. In 1856 he removed to New Britain, Conn., where he learned the trade of rule-making and practised civil engineering with his father. He was teller of the New Britain National Bank for five years, cashier of the Home National Bank of Meriden, 1867, and its president since 1881. He has held local municipal offices, was a member of the General Assembly, 1877, comptroller 1901–2, and governor of Connecticut, 1903–4.

Chamberlain, Alexander Francis, American anthropologist: b. Kenninghall, England, 12 Jan. 1865. He was graduated at Toronto University in 1886, and became a member of numerous learned societies. Since 1892 he has been lecturer on anthropology at Clark Uni-

versity, Worcester, Mass. He has written 'The Child and Childhood in Folk-Thought' (1896); 'The Child; a Study in the Evolution of Man' (1900); and many essays on similar topics.

Chamberlain, Basil Hall, English Japanese scholar: b. Southsea 18 Oct. 1850. He is a grandson of Basil Hall (q.v.). He is emeritus professor of Japanese and philology at the Imperial University of Tokyo, and has published 'The Classical Poetry of the Japanese' (1880); 'Translation of the Kojik' (1883); 'A Romanized Japanese Reader' (1886); 'Language, Mythology, and Geographical Nomenclature of Japan in the Light of Aino Studies' (1887); 'Luchuan Grammar' 1895); 'Handbook of Colloquial Japanese'; 'Things Japanese.'

Chamberlain, Daniel Henry, American lawyer: b. West Brookfield, Mass., 23 June 1835. He graduated at Yale with high honors in 1862, and at Harvard Law School in 1863. In 1864 he was commissioned lieutenant in the 5th Massachusetts colored cavalry, served in Maryland, Louisiana, and Texas, and was promoted captain. In 1866 he settled as a cotton planter in South Carolina. Upon the call for a constitutional convention, he was chosen a delegate, and was subsequently elected attorney-general, a position he held for four years. From 1872 to 1874 he practised law at Columbia, S. C. He was governor of the State 1874–7. Though renominated in 1876 and reinaugurated in January 1877, his election was contested by Wade Hampton, the Democratic candidate for governor. After the inauguration of President Hayes, both contestants were invited to a conference at Washington, which resulted in the U. S. troops (which had been sent to support Chamberlain) being withdrawn from South Carolina, and Gov. Chamberlain withdrawing his claim to election. He resumed law practice in New York city until his retirement to West Brookfield, Mass. He has published several addresses and pamphlets, the latest of which is 'Charles Sumner and the Treaty of Washington' (1902).

Chamberlain, Henry Richardson, American journalist: b. Illinois 25 Aug. 1859. He engaged in journalism in Boston and New York, being managing editor of the New York *Press* in 1888, and of the Boston *Journal* in 1891, and since 1892 has been London correspondent for the New York *Sun*. He has published 'Six Thousand Tons of Gold' (1894).

Chamberlain, J. Austen, English politician, son of Joseph Chamberlain (q.v.): b. 1863. He was educated at Rugby, and Trinity College, Cambridge. He was financial secretary to the Treasury, 1900–2, and has been postmaster-general from 1902. In appearance he bears a striking resemblance to his father, the noted colonial secretary.

Chamberlain, Jacob C., American missionary: b. Sharon, Conn., 13 April 1835. He graduated at Western Reserve College 1856; studied at the Dutch Reformed Church theological seminary 1859, and also took a medical degree at the College of Physicians and Surgeons in New York. In December 1859, he went as a medical missionary to southern India, and has resided in the Madras presidency ever since, with the exception of three visits to the United States. He established a hospital and dispensary at Madanapalli 1868, and another at Palamanair 1872. He translated the Reformed Church liturgy into Telugu Madras 1873), and also 'Hymns for Public and Social Worship' (1884). He has written 'The Bible Tested' (1878; 7th ed. 1885); 'Native Churches and Foreign Missionary Societies' (1879); 'Winding up a Horse; or Christian Giving' (1879); 'Break Cocoanuts Over the Wheels: or All Pull for Christ' (1885).

Chamberlain, Joseph, English statesman: b. London July 1836. He was educated at University College School, and entered his father's screw factory at Birmingham, from which, however, he retired in 1874. He had by this time acquired considerable celebrity as a Radical politician. In 1868 he was appointed a member of the Birmingham town-council, was mayor of Birmingham from 1873 to 1876, and chairman of the Birmingham school-board from 1874 to 1876. After unsuccessfully contesting Sheffield against Mr. Roebuck in 1874, he was returned for Birmingham without opposition in June 1876. He soon made his mark in Parliament, and on the return of the Liberals to power in 1880 was appointed president of the Board of Trade, with a seat in the cabinet. To Mr. Chamberlain's exertions was due the passing of the Bankruptcy Bill, but his efforts to amend the Merchant Shipping Acts were unsuccessful. Meanwhile his influence was increasing rapidly outside the House; he came to be regarded as the leader of the extreme Radical party, and enunciated schemes for the regeneration of the masses which were based on the doctrines of the "restitution" of land and the "ransom" of property. During the last hours of Mr. Gladstone's government he was understood to be opposed to the renewal of the Irish Crimes Act; and during the general election of 1886 he was most severe in his strictures on the moderate Liberals, and produced an "unauthorized" programme (in opposition to that of Mr. Gladstone), which included the readjustment of taxation, free schools, and the creation of allotments by compulsory purchase. He was returned free of expense by the western division of Birmingham. On 1 Feb. 1886 he became president of the Local Government Board, but resigned on 26 March, because of his strong objections to Mr. Gladstone's Home Rule measures for Ireland, and after the "Round Table" conference had failed to reunite the Liberal party he assumed an attitude of uncompromising hostility to his old leader's new policy, and was bitterly assailed by Home Rulers as a renegade. He became leader of the Liberal-Unionists when the Duke of Devonshire went to the Upper House. Lord Salisbury sent him to Washington as commissioner on the Canadian fishery dispute, and in 1895 he was made colonial minister in the Unionist Cabinet.

In that capacity his chief aim has been to unite more closely the colonies with the mother country. During his tenure of office he has had various difficult matters to handle, such as the negotiations concerning the "Jameson raid" on the Transvaal in December 1895, and the French claims in West Africa. On news of the "raid" being received, Mr. Chamberlain at once repudiated all connection with it on the part

of the British authorities; and he subsequently denied in the most distinct manner having had any personal foreknowledge or suspicion of what was about to take place. His conduct of the negotiations with the South African Republic preceding the outbreak of war in 1899 met with enthusiastic support from many and severe censure from others. Since the conclusion of the Boer war he has visited South Africa and by his personal influence done much to bring about a good understanding between the Boers and the English government. He had much to do with the passing of the Workmen's Compensation Act of 1897. In 1896 the students of Glasgow University elected him lord rector. He carried the Australian Federation measure in Parliament (1900), and later had to face opposition from within the Liberal party. In 1888 he was married to Mary, daughter of William C. Endicott, secretary of war in President Cleveland's first administration. He resigned from the Cabinet in 1903, owing to his protariff views.

Chamberlain, Joshua Lawrence, American army officer and educator: b. Bangor, Maine, 8 Sept. 1828. He was graduated at Bowdoin College in 1852, and entered the volunteer service of the Union in 1862, was promoted to the rank of brigadier-general by Gen. Grant, for bravery at Petersburg 1864; became a major-general in 1865, and received the colors of Lee's army on its surrender. In 1867–71 he was governor of Maine, and in 1871–83 was president of Bowdoin, resigning to engage in business in New York.

Chamberlain, Mellen, American lawyer: b. Pembroke, N. H., 4 June 1821; d. Chelsea, Mass., 25 June 1900. He graduated at Dartmouth College in 1844, and at the Harvard Law School in 1848. In 1849 he was admitted to the bar, opened a law office in Boston, and made his residence in Chelsea, where, during 51 years of citizenship he served the town in many public capacities. In 1858 and 1859 he was a member of the Massachusetts House of Representatives, and of the Senate in 1863–4. He was associate justice of the municipal court of Boston 1866–70, and chief justice 1870–8. On 26 Aug. 1878 he was chosen librarian of the Boston Public Library, serving until ill health compelled his retirement in 1890. During his administration the new library building was begun, and the corner-stone laid. Throughout his life he was a close student and investigator of American history. Besides important chapters in Winsor's 'Memorial History of Boston' (1881), and 'Narrative and Critical History of America' (1888), he wrote: 'John Adams, the Statesman of the Revolution' (1884); 'The Authentication of the Declaration of Independence' (1885); 'John Adams, the Statesman, with Other Essays and Addresses' (1898).

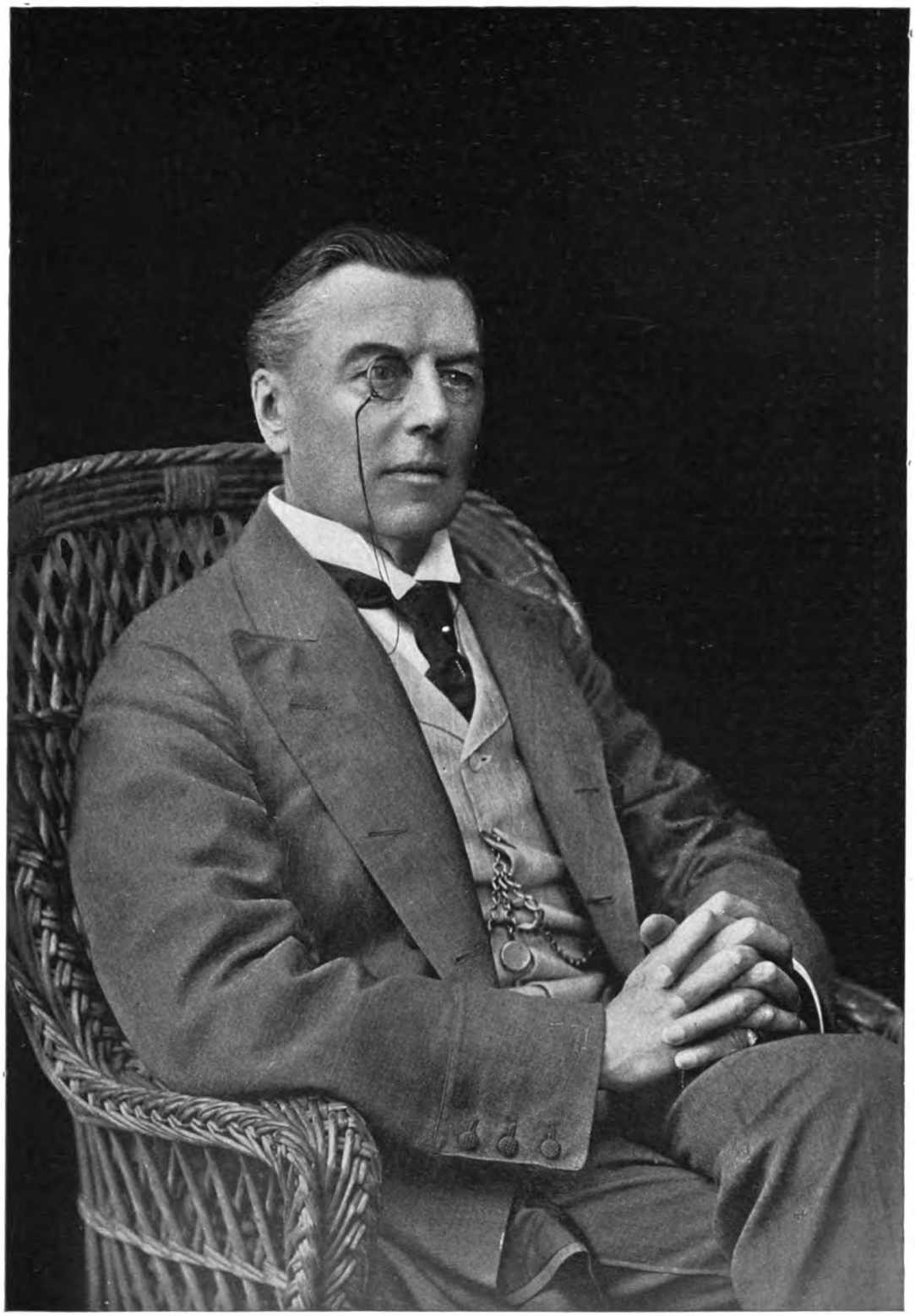
Chamberlain, Montague, American naturalist: b. St. John, New Brunswick, 5 April 1844. He was educated privately, both his parents being teachers. Though engaged in mercantile pursuits, he devoted much time to the study of natural history and came to be well known as an ornithological writer. In 1889 he became assistant secretary of the Lawrence Scientific School of Harvard University, and since 1893 has been secretary. He is a member of several scientific bodies, and his chief publications are: 'Canadian Birds' (1870); 'Birds of New Brunswick' (1882); 'Mammals of New Brunswick' (1884); 'Systematic Table of Canadian Birds' (1887); 'Birds of Greenland' (1892); 'Some Canadian Birds' (1895); 'Maliseet Vocabulary' (1899); 'The Penobscot Indians' (1899).

Chamberlain, Nathan Henry, American clergyman: b. Bourne, Mass., 25 Dec. 1830; d. there 1 April 1901. He graduated at Harvard, 1853, and studied theology at the divinity school there, and at Heidelberg, Germany, eventually becoming a Unitarian minister. He was pastor at Canton, Mass., 1857–9, and at Baltimore, Md., 1860–3. He then took orders in the Episcopal Church, and became rector at Birmingham, Conn., 1864–7; Morrisania, N. Y., 1868–71; Milwaukee, Wis., 1871–3; Somerville, Mass., 1874–9; East Boston, Mass., 1882–9. He then retired to devote himself to literary pursuits. His books are: 'Autobiography of a New England Parish' (1864); 'The Sphinx in Aubrey Parish' (1889); 'What is the Matter with our Tariff and its Taxes' (1890); 'Samuel Sewall and the World He Lived In' (1897), an admirable study of colonial life in New England; 'Life of Sir Charles Napier'; 'An Itinerary of Cape Cod.'

Chamberlain, Thomas Crowder, American geologist: b. Mattoon, Ill., 25 Sept. 1843. He was educated at Beloit College and the University of Michigan; was professor of natural sciences in Whitewater Normal School, Wis., 1869–73; professor of geology at Beloit College 1873–82; president of the University of Wisconsin 1887–92; and has been dean of the scientific faculty of the University of Chicago from 1892. He was assistant State geologist of Wisconsin 1873–6, and State geologist from 1876. He is the author of 'Geology of Wisconsin' and of many important papers printed by the United States Geological Survey.

Chamberlain, a court officer, originally employed, as the name indicates, to take charge either of the private apartments of a prince, or of a treasury, called in the 10th century *camera* (whence the word chamber). The golden key, which is worn by the chamberlains of the European courts on two small golden buttons (as well as the buttons themselves, when the key is omitted), indicates also the origin of the office. At present the employment of chamberlains (when their office is not merely nominal) is to attend on the persons of the princes and their consorts. There is generally a chief or high chamberlain. This officer in England is called Lord Great Chamberlain of England. His office is one of great antiquity and honor, being ranked as the sixth great office of the English crown. He dresses and undresses the king before and after the coronation. There exist also a lord chamberlain of the household, a lord chamberlain of the queen's household, etc.

Chamberlin, Joseph Edgar, American journalist: b. Newbury, Vt., 6 Aug. 1851. Until 1890 he was on the staffs of papers in Newport, R. I., Fall River, Mass., Chicago, and Boston. From 1891 to 1898 he was assistant editor of the 'Youth's Companion,' an essayist and magazine writer. During the Spanish war he was war correspondent of the New York *Evening Post* in Cuba. He has published: 'The Lis-



MR. JOSEPH CHAMBERLAIN.

Mau

tener in the Town'; 'The Listener in the Country.'

Chambers, chām'bėrz, **Charles Julius,** American journalist and novelist: b. Bellefontaine, Ohio, 21 Nov. 1850. In 1870 he traveled through the West Indies, Europe, the United States, and Canada, as special correspondent of the New York *Herald.* In 1876 he published an account of his few weeks of experience (incognito) in an insane institution, entitled, 'A Mad World,' which excited great interest. He has also published several novels: 'On a Margin'; 'Lovers Four and Maidens Five'; 'Chats on Journalism'; 'Missing'; 'The Rascal Club'; 'One Woman's Life.'

Chambers, Edward Thomas Davies, Canadian journalist: b. Saffron Walden, Essex, England, 1852. He removed to Canada in 1870, and after teaching a short time entered journalism, becoming chief editor of the Quebec *Daily Chronicle* in 1897. He has published 'The Port of Quebec' (1890); 'The Haunts of the Ouaniche' (1891); 'Quebec: Ancient and Modern' (1892); 'Quebec, Lake Saint John and the Saguenay' (1893); 'Chambers' Guide to Quebec' (1895); 'The Book of the Ouaniche and its Canadian Environment' (1896).

Chambers, Ephraim, English miscellaneous writer, and compiler of a popular 'Dictionary of Arts and Sciences': b. Kendal, Westmoreland, about 1680; d. 15 May 1740. On leaving school he was apprenticed to a mathematical instrument and globe maker in London. Here he acquired such a taste for the study of science, and made so much proficiency in it, that he not only formed the design of compiling his famous 'Cyclopædia,' but actually wrote some of the articles for it behind his master's counter. The first edition of this work was published in 1728, and Chambers was soon after chosen F.R.S. Two subsequent editions, in 1738 and 1739, appeared previously to his death. A French translation of the 'Cyclopædia' was the basis of the 'Encyclopédie' of Diderot and D'Alembert. A revised and enlarged edition was brought out first by Scott and Hill, and afterward, 1781–6, by Dr. Rees, who latterly built up on it the work known by his own name.

Chambers, George Frederick, English publicist: b. 18 Oct. 1841. He was educated at King's College, London, and has filled various public appointments. Besides editing various legal text-books, guides to Sussex, etc., he is the author of 'Hand-book of Descriptive and Practical Astronomy'; 'Pictorial Astronomy' (1891); 'The Story of the Sun, Stars, Eclipses, Weather' (1896–9), etc.

Chambers, Robert, Scottish prose-writer and publisher: b. Peebles 10 July 1802; d. Saint Andrews 17 March 1871. He and his brother William began in poverty as small booksellers; issued penny leaflets of useful information for the people, written in a clear and simple though not infantile style, which became very popular, and at last took regular periodical form in 'Chambers' Journal,' and the great publishing-house which bears the name of both developed gradually. The 'Chambers' Encyclopædia for the People' was the outgrowth of the 'Journal,' and edited by the brothers. Robert wrote also 'Traditions of Edinburgh'; 'History of the British Empire'; 'Domestic Annals of Scotland'; 'The Book of Days'; 'Cyclopedia of English Literature'; 'Ancient Sea Margins'; etc., but his most noted book was the anonymous 'Vestiges of Creation,' for years an unequaled theologic-scientific sensation.

Chambers, Robert William, American artist and novelist: b. Brooklyn, N. Y., 26 May 1865. He has written: 'In the Quarter' (1893); 'The King in Yellow' (1893); 'The Red Republic' (1894); 'A King and a Few Dukes' (1894); 'The Maker of Moons' (1895); 'Oliver Lock'; 'The Mystery of Choice' (1896); 'Lorraine' (1896); 'Ashes of Empire' (1897); 'The Haunts of Men' (1898); 'The Cambric Mask' 1899); 'Outsiders' (1899); 'The Conspirators' (1900); 'Cardigan' (1901); and 'With the Band,' a volume of ballads.

Chambers, Talbot Wilson, American clergyman: b. Carlisle, Pa., 25 Feb. 1819; d. New York 3 Feb. 1896. He graduated at Rutgers, 1834; studied theology at the Reformed Church Seminary there, and also at Princeton. He was pastor of the Reformed Dutch Church in Somerville, N. J., 1839–49. In 1849 he was installed a pastor of the Collegiate Dutch Church in New York, and remained in association with the Middle Dutch Church congregation until his death. He was a member of the American Bible Revision Committee, and for many years chairman of the committee on versions of the American Bible Society. He wrote: 'The Noon Prayer Meeting in Fulton Street' (1857); 'Memoir of Theodore Frelinghuysen' (1863); 'Exposition of the Book of Zechariah' (1874), in 'Lange's Commentary'; 'The Psalter a Witness to the Divine Origin of the Bible' (1875); 'Companion to the Revised Version of the Old Testament' (1885).

Chambers, Sir **William,** English architect: b. of Scottish parents, Stockholm, Sweden, 1726; d. London 8 March 1796. He was educated at Ripon, in Yorkshire, and while very young went as supercargo to the East Indies, resided for some time in China, and brought back many drawings of Chinese buildings and costume, which were afterward published. He then devoted himself to the study of architecture, and on returning from travels in France and Italy was appointed drawing master to the Prince of Wales, afterward George III. He laid out the royal gardens at Kew in the Chinese style, and built the villa of the Earl of Besborough at Roehampton, in the Italian style, a mansion for Lord Abercorn, near Edinburgh, and houses for Lord Melbourne and the Earl of Gower, at Whitehall and in Piccadilly. His masterpiece was Somerset house in London, which he rebuilt in 1775. He published in 1759–68, a 'Treatise on Civil Architecture,' several times reprinted; in 1772, a 'Dissertation on Oriental Gardening.'

Chambers, William, Scottish publisher and miscellaneous writer: b. Peebles 16 April 1800; d. Edinburgh 20 May 1883. He was a brother of Robert Chambers (q.v.). He published 'Things as They Are in America' (1853), 'American Slavery and Color' (1857); 'France: Its History and Revolutions' (1871); 'Stories of Old Families,' etc. In 1859 he bestowed on his birthplace the commodious suite of buildings known as the Chambers Institute, comprising a library, reading-room, lecture-room, art-gallery, and museum. Of his native county he published

a history in 1864. In 1865 he was elected Lord Provost of Edinburgh, in which capacity he organized and carried out many extensive and useful measures of sanitary improvement. Between 1871 and 1883 he spent upward of $100,000 on the restoration of St. Giles' Cathedral, Edinburgh.

Chambers of Commerce, associations formed by tradesmen and merchants for the purpose of protecting and furthering the commercial interests of the community to which the chamber belongs. Among the various methods employed to promote the ends of such associations are the following: The influence of legislative action for the benefit of commerce, the collection of trade statistics, the gaining of economical or other advantages, by combination, the settlement by arbitration of mercantile disagreements. The oldest body of the nature of a chamber of commerce was started in Marseilles at the close of the 17th century. The value of such bodies became apparent and they sprang up rapidly throughout the civilized world. In mediæval Venice and in the Hanse towns they do not seem to have existed in the sense in which they are understood to-day. The first institution of the kind in the United States, the New York Chamber of Commerce, was organized in 1768 and incorporated by royal charter from King George III. in 1770. There are similar bodies in every city and town of consequence in the United States. The oldest Chamber of Commerce in Great Britain, that of Glasgow, dates from 1783. Edinburgh followed two years later, and for long held a leading position, but the most important British chamber of commerce at the present time is that of London, founded so lately as 1881. It has instituted a series of examinations in commercial subjects, and lectures are delivered under its auspices. Junior and senior commercial certificates are granted after examination to those who display the amount of knowledge required. In 1860 there was formed an Association of Chambers of Commerce of the United Kingdom, which holds annual meetings in London. It includes nearly 100 chambers.

The extension of the functions of chambers of commerce in the United States has been considerable in the decade between 1890 and 1900. The movement had its origin in Germany and grew out of the organized efforts of the last 20 years to foster the world commerce of the empire. The chambers of commerce in leading cities like Berlin and Hamburg undertook the commercial training of young men, with a view to their future advancement in mercantile life and the consular service. The result was the securing of a higher order of talent in such pursuits. The hint thus thrown out was promptly taken up in the United States. The New York Chamber of Commerce, in 1899, voted a fund for the endowment of a lecture course on commerce at Columbia University; in Chicago a chair of commerce was established by that city's chamber at the University of Chicago, and in August 1900 a School of Commerce, Accounts, and Finance was established by the University of New York. Students were assured in the event of a satisfactory course of study, that they would be given posts in leading commercial establishments or appointed to consular offices so far as influence could attain that result. The movement is destined to mark a new era in the influence of chambers of commerce.

Cham'bersburg, Pa., a borough and county-seat of Franklin County, on the Conecocheague and Falling Creeks and the Cumberland Valley and W. and the Philadelphia & R. R.R.'s, 49 miles west-southwest of Harrisburg. In Early's raid in the Civil War Gen. McCausland entered Chambersburg with Confederate cavalry, 30 July 1864, and demanded a tribute of $100,000 gold; this not being paid the place was set on fire and two thirds of it burned, causing a loss of $1,000,000. It was soon rebuilt, chiefly of brick or stone, and is now the seat of Wilson College for women, and has an academy, several churches and newspapers, public schools, manufactories, machine shops, two national banks, and an assessed property valuation of $3,000,000. In the environs blue limestone, freestone, and marble abound. Pop. (1900) 8,864.

Chambertin, shäṅ'-bėr-tăṅ, a superior red Burgundy wine, named after the place where it is produced, in the department of Côte d'Or.

Chambéry, shäṅ-bā-rē, France, capital city of the department of Savoy, at the junction of two small rivers, near the Isère, between two mountains on the border of a fertile plain. It is an archbishop's see, and contains a cathedral, six hospitals, a castle, now the prefecture, the palace of justice, barracks, a covered market, a college, a museum, and a public library with 25,000 volumes. The old ramparts have been converted into public walks. In its vicinity are excellent baths, much frequented in summer. Its suburbs are large with many fine villas. It has considerable manufactures and distilleries; trade in grain, silk, cattle, etc. Chambéry was founded about the 10th century. It was under feudal lords till 1230, when it was ceded to Thomas, first Count of Savoy, who built the castle, where the princes of the house of Savoy resided till the government was removed to Turin. The town was surrendered to the French in 1792, and became the capital of the department of Mont Blanc. It was restored in 1815, and ceded to France again in 1860. Pop. (1900) 22,000.

Chambezi, chăm-bē'zĭ, a river of Africa, rising in the highlands south of Lake Tanganyika, about lat. 9° 40′ S., and lon. 33° 15′ E. Its tributaries are large, and form a considerable stream, which flows southwest to Lake Bangweolo.

Chambly, shäṅ-blē, **Fort,** a fort situated near the rapids of the Richelieu or Chambly, at the outlet of Lake Champlain, during the time of the Revolutionary War. It was captured by the Colonists under Col. Bedel in 1775, and the colors of the Seventh Regiment of British regulars was sent to the Continental Congress as trophies of the victory.

Chambly River, a river of Canada, the same as the Richelieu (q.v.) or St. John.

Chambord, shäṅ-bôr, **Henri Charles Ferdinand Marie Dieudonné,** dē-ė-dŏn-nā, COMTE DE, Duke of Bordeaux, French noble: b. Paris 29 Sept. 1820; d. Frohsdorf, Austria, 24 Aug. 1883. He was the last representative of the elder branch of the French Bourbon dynasty, and was called by his partisans Henry V. of France. He was born after the assassination of

CHAMELEON.

his father, Prince Charles Ferdinand d'Artois, Duc de Berry. Charles X., after the revolutionary outbreak of 1830, abdicated in his favor; but the young count was compelled to leave the country with the royal title unrecognized by the nation. He lived successively in Scotland, Austria, Italy, and London, keeping a sort of court, and occasionally issuing manifestos. In 1846 he married the Princess Maria Theresa, eldest daughter of the Duke of Modena; and in 1851 inherited the domain of Frohsdorf, near Vienna, where for the most part he subsequently resided. While abstaining from violent attempts to seize the crown, he let slip no opportunity of urging his claims, especially after Sedan; but his belief in divine right, and his failure to recognize accomplished facts and modern tendencies, destroyed all chance of his succession.

Chambord, France, a castle, park, and village, near Blois, department of Loir-et-Cher. The splendid castle stands in the middle of a park, enclosed by walls extending eight leagues. It contains 440 rooms, 13 large staircases, and stalls for the reception of 1,200 horses. It was built in the Gothic style, by Primatice, for Francis I., and completed under Louis XIV. Here Francis I. indulged his inclination for gallantry; here the arts first sprang to life in France; and here King Stanislaus Leczinsky resided for nine years. In 1745 it was given by Louis XV. to Marshal Saxe, who died there in 1750. The Emperor Napoleon I. gave the domain of Chambord to Marshal Berthier, and in 1821 a company of Legitimists bought it and gave it to the Duke of Bordeaux, son of the Duke de Berry and grandson of Charles X.

Chambray, Georges, zhŏrzh shäṅ-brā, MARQUIS DE, French general: b. Paris 1783; d. 1848. He served in the Napoleonic wars, fell into the power of the Russians, was banished to the Ukraine, and not permitted to return to France until after the fall of Napoleon. From 1823 to 1829, he filled high military positions at Vincennes and Perpignan. He wrote various works on military subjects. A second edition of his 'Philosophie de la guerre' appeared in 1835, and a 'Life of Vauban,' written by him, appeared in the 'Plutarque Français.' His most important production is his 'Histoire de l'expédition de Russie,' which appeared in 1837, and has since passed through several editions.

Chambre Ardente, shäṅbr är-däṅt ("fiery chamber"), an apartment hung with black and lighted with tapers, in which the corpse of a person of distinction is deposited before the funeral ceremonies. The name was formerly given in France to an apartment, similarly draped and lighted, in which sentence of death, frequently by burning, was pronounced on heinous offenders. In a historical sense the term is more especially given to those extraordinary tribunals which, from the time of Francis I., directed the persecutions against heretics, and acted as a sort of inquisition. The members of the tribunal were named by the Pope. They ferretted out heretics, directed the proceedings against them, pronounced sentence, and also saw it carried into execution. A chambre ardente was established by Louis XIV. to put a stop to the numerous cases of poisoning which, after the proceedings against the Marchioness of Brinvilliers, were brought before the public. Many persons of the highest rank, among others the Marshal of Luxemburg and Princess Louise of Savoy, were brought before this court, which, however, existed only for two years, and ceased in 1680. The last exercise of its powers was the condemnation of the celebrated sorceress, Voisin.

Chambre des Comptes, dā kŏnt, a great court established in France prior to the Revolution, for various purposes; as for the registration of edicts, ordinances, letters patent, treaties of peace, etc. The sovereign Chambre des Comptes was held at Paris; there were also inferior courts in 10 provincial cities.

Chambre Introuvable, äṅ-troo-vä-bl ("the chamber the like of which is not to be found again"), the term applied to the French Chamber of Deputies which met after the second return of Louis XVIII., and which by its fanatic loyalty threatened to again plunge France into anarchy and commotion.

Chameck, chä-mĕk', a species of spider-monkey. See COATA; SPIDER-MONKEY.

Chameleon, ka-mēl'yŭn or ka-mē'lē-ŏn, lizard belonging to the family *Chamæleontidæ.* The chameleons are generally considered as constituting a sub-order or equivalent primary division of the *Lacertilia* (q.v.). All parts of their anatomy present striking peculiarities. The parietal and equamosal bones are greatly produced and meet at a common apex, thus forming a bony tripod which supports the integument of a conspicuous crest or casque on the posterior part of the head. In many species the strangeness of the physiognomy is enhanced by warts, serrated crests, and prominent spines. Trifid teeth are situated on the ridge (acrodont) of the maxillary and dentary bones, but the premaxillary is toothless. The eyelids are almost completely united, leaving only a minute circular orifice through which the animal sees, and which moves with the eyeball in its almost constant rovings. More remarkable still is the well-known fact that the two eyeballs move quite independently; one may be directed at an object behind while the other views one in front. The tongue is club-shaped at the free end and slips into a sheath at the base, from which it can be projected by a complex mechanism to a distance of more than half the total length of the animal, and returns, like a bit of rubber, with great rapidity to its former position. Quite unique among lizards is the prehensile tail, which rolls downward in a flat spiral and is utilized for clinging to twigs. Serving the same purpose in the arboreal life of the animal are the almost equally peculiar feet, which have five toes arranged in two opposed sets on both fore and hind feet, but in the former the first, second, and third toes form the inner and the fourth and fifth the outer group; while on the hind feet the first and second are internal, the remaining three in the opposed outer group. Among internal peculiarities may be mentioned the lungs, which are produced into a series of long tubular diverticula, which extend to all parts of the trunk, and by means of which the chameleon is enabled to swell up its body in the fashion of a toad when angry or threatened. But the chameleon is most famous for an attribute which is by no means confined to it, but is common to many lizards and other animals. The well-known facility with which

it changes its colors is referred to. This is accomplished at the will of the animal, or results from the direct influence of external stimuli, by a relatively simple mechanism. The outer portion of the skin or epidermis is transparent; beneath this is a layer of cells filled with granules and oil-drops which appear white or yellow; among and beneath these again are large irregular chromatophores or cells filled with black and red pigment granules. These chromatophores are under the control of the nervous system, and have the power, when appropriately stimulated, of sending out long branching processes filled with pigment into the spaces between and external to the light-colored cells. When this occurs the latter cells are concealed by a pigment curtain and the animal appears dark-colored; when, on the other hand, the chromatophore processes are withdrawn, and the pigment is concentrated in the deeper layers of the skin, the animal appears pale. The rapid play of colors is due to the interchange of these two conditions in varying degrees.

Upward of 50 species of chameleons are known, belonging to the typical genus *Chamæleon*, and a few others. With the exception of a few species which inhabit Arabia and India, and one whose range extends across the Mediterranean into southern Spain, all are confined to Africa, and a very large number of the strangest forms to the island of Madagascar. The common chameleon (*C. vulgaris*) is the one which inhabits the shores of the Mediterranean, and, through being so well known to Europeans, has made the peculiarities of these lizards almost proverbial.

In the United States the name chameleon is commonly applied to a lizard (*Anolis principalis*) and its allies, belonging to a quite different group. The American chameleon belongs to a genus and family *Iguanidæ* (q.v.) of numerous species which swarm in tropical America and the West Indies. It is probable that it has been popularly classed with its African namesake because of the equal facility with which changes of color are effected. It may be bright green, yellowish-gray, rich brown, or almost black, and the male is peculiar in having beneath the throat a pouch of elastic skin which can be inflated by means of a pair of delicate bony rods belonging to the skeleton of the tongue, when it appears of a flaming orange or vermilion color. They are dainty, smooth-bodied little animals, and are chiefly arboreal, jumping from twig to twig in pursuit of insects with an activity that contrasts strongly with the sluggishness of the European chameleon, which depends upon its projectile tongue to secure its game. *Anolis principalis* is the only member of the genus which enters the United States, and is quite common in Florida and other southern States, from which numbers were shipped to the north a few years ago to supply the requirements of a silly fashion in vogue at that time of wearing the pretty lizards secured to the dress by a tiny golden chain about its neck. Owing to the ignorance of the wearers, many of the chameleons quickly succumbed to thirst, as they, in common with most lizards, require a constant supply of water.

Chameleon, a southern constellation containing nine stars, lying within the Antarctic polar circle.

Chameleon Mineral, manganate of potassium, so called because a solution of it changes from green, through a succession of colors, to a rich purple.

Chamfort, shän-fôr, **Sébastien-Roch Nicolas,** French revolutionist: b. near Clermont in Auvergne 1741; d. 1794. He made his début as a litterateur under the name of Chamfort, and obtained some success as a dramatist and as a critic, which procured him a place in the French Academy, a pension, and a place at court. An independent and somewhat misanthropic spirit made him, however, in spite of his interest, favor the Revolution, of which he became the epigrammatist. He resigned his employment at court, and took the literary editorship of the 'Mercury.' He furnished Sièyes with the idea and the title of his famous pamphlet 'Qu'est-ce que le Tiers-É at?' and forged such popular watch-words as: Guerre aux châteaux, paix aux chaumières ("War to the castles, peace to the cottages"). He was employed by Roland in the 'National Library,' and published the first 26 'Tableaux Historiques de la Révolution.' Threatened with imprisonment, he endeavored to blow out his brains. Though not immediately fatal, the wounds he inflicted on himself ultimately put a period to his life. His poetry has now little reputation. His best work, 'Mustapha and Zeangir,' at which he labored for 15 years, exhibits him as a feeble follower of Racine and Voltaire. It is praised for purity of style and mildness of sentiment; but, as a French critic pungently observes, he reserved all his mildness for his tragedies. A collection of 1,800 *bon mots,* under the title 'Chamfortiana,' is now considered the best memorial of him. In this he appears as a man to make himself feared rather than loved.

Chamier, shä-mēr', **Frederick,** English novelist: b. London 1796; d. 1870. He entered the navy at an early age, took part in the last campaigns against the French, and distinguished himself in the American war of 1812. He retired in 1833 with the rank of captain, and living at Waltham Hill, acted as a justice of the peace for the counties of Hertford and Essex. He imitated Captain Marryat in making his experience of a sea life the basis of a series of romantic tales, but did not equal him in humor and imagination. He has, however, been credited with great fidelity to nature. His principal works are: 'The Life of a Sailor' (1834); 'Ben Brace' (1835); 'The Arethusa' (1836); 'Jack Adams' (1838); 'Tom Bowline' (1839). He also published a review of the scenes witnessed by him in the revolution of 1848.

Chaminade, shä-mē-näd, **Cecile Louise Stephanie,** French musician: b. Paris 8 Aug. 1861. She studied at Paris under Le Couppey, Savard, Marsick, and Benjamin Godard; soon acquired a high reputation as a pianist, and played at concerts in Paris, Berlin, Vienna, London, Constantinople, and other cities. Her compositions, which are widely known, include 'Callirhoë,' a ballet symphony performed with great success at Marseilles (1888), Lyons (1889), and Bordeaux (1901); 'Les Amazones'; 'Ménétriers'; and a number of songs, among which are 'Madrigal'; 'Chanson Slave';

'Ritournelle'; 'Fleur de Matin'; and 'Sans Amour.'

Chamisso, shä-mēs'sō, **Adelbert de** (properly Louis Charles Adelaide de Chamisso de Boncourt), German writer: b. at the castle of Boncourt, Champagne, 27 Jan. 1781; d. Berlin 21 Aug. 1838. When a boy his family were driven by the breaking out of the Revolution to seek an asylum in Berlin. On the Peace of Tilsit he returned with his family to France, and in 1810 was appointed professor in the Lyceum of Napoleonsville; but shortly after returned to Prussia, and during three years devoted himself enthusiastically to the study of natural science at Berlin. Count Romanzoff having in 1815 fitted out a vessel, under the command of Otto von Kotzebue, for the discovery of the northwest passage, Chamisso accepted the appointment of naturalist to the expedition, and added greatly to his store of scientific knowledge. He afterward took up his residence at Berlin, was appointed superintendent of the botanic garden, and received the diploma of doctor from the university for the collections in natural history which he had presented to the museum. His abilities as a naturalist are displayed in his work 'De Animalibus quibusdam e Classe Vermium Linnæi' (1819); and his 'View of the Most Useful and the Most Noxious Plants of North Germany, with Remarks on Scientific Botany.' In 1827, partly for the purpose of rebutting the charges brought against him by Kotzebue, he published 'Views and Remarks on a Voyage of Discovery,' and 'Description of a Voyage Round the World.' Both works display great accuracy and industry. His last scientific labor was a tract on the 'Language of Owyhee.' His reputation as a naturalist has been somewhat eclipsed by that which he acquired as a poet. As early as 1804–6 he, in concert with Varnhagen von Ense, published a collection of poems, under the name of the 'Muses' Almanac'; and in 1813 appeared his celebrated and most original tale, 'Peter Schlemihl,' which has been translated, among other languages, into English, and admirably illustrated by Cruikshank. His poetry is marked by vigor, correctness, and a thorough command of the German language; but is in general of a gloomy and terrific cast. He is the author, however, of several humorous pieces; and his political poems are distinguished by caustic, yet wholesome raillery. Many of his ballads and songs are masterpieces of their kind. See Hitzig, 'Leben und Briefe von A von Chamisso' (1839); Fulda, 'Chamisso und seine Zeit' (1881); Raymond, 'A von Chamisso als Naturforscher' (1889).

Chamois, shăm-wä or shăm'ĭ, a horned animal (*Rupicapra tragus*) classed among the goat-antelopes, and native to the mountains of middle and southern Europe from the Pyrenees to the Caucasus and Georgian Mountains, and as far east as Persia. The chamois found in the Pyrenees and in the Caucasus differ in local peculiarities from the Tyrolese, which is the race-type. This is about the size of a goat; but its neck is somewhat longer in proportion than that of the goat and is more graceful. The general color is brown; the head pale, almost yellow, with a dark marking on each cheek; the nails black. The short black horns rise straight from the forehead, and are recurved at the tip. The chamois may be found in summer, in the highest Alpine altitudes, close to, and indeed beyond, the snow-line. In winter it seeks the forests, where it is somewhat protected. These forests furnish also a covert for the females and fawns, and supply the aromatic herbs on which the chamois feed, sometimes in considerable herds, though in the Alps, where they have been much hunted, the herds are small. The breeding season is in May and June.

The chamois is famous for its agility. It crosses easily, and without hesitation, chasms 15 feet or more in width; leaps rock walls a dozen feet high as easily as a boy vaults a low fence, and roams through mountain passes which other quadrupeds would shun,— dashing, with sudden leap, down almost perpendicular walls, and alighting on incredibly narrow ledges, with its fore feet so close to its hind feet as almost to touch. The creature is timid; and when feeding in flocks, one is always on the watch to announce danger by a peculiar whistling noise.

Chamois-hunting as a sport is almost impossible in the Alps, as the numbers have been so reduced by continuous hunting that the remaining ones are protected by law — only a few being annually at the disposal of the hunter; but, in the Carpathians and eastward the sport is not restricted; and he who possesses the mountaineering and sportsman-like qualities necessary may there stalk his game alone, or with a native guide, through dangerous mountain defiles.

Chamois leather is valuable commercially for its softness and warmth (see Leather), and the flesh is esteemed a table delicacy. The horns are used for ornamental purposes, especially in making souvenirs of Alpine tourist resorts.

Cham'omile. See Camomile.

Chamond, St. See St. Chamond.

Chamore'ril, a lake with apparently no outlet, in Middle Tibet, on a plateau 15,000 feet above the sea, between the upper waters of the Sutlej and the Indus. It is surrounded by mountains some 5,000 feet in height, from which it receives much water. Its length of 15 miles and width of 2½ are pretty constant. On account of its great depth it freezes only in winter.

Chamouni, shä-moo-nē, or **Chamonix,** shä-mō-nē, a celebrated valley of France, in the department of Haute-Savoy, district Faucigny, in the Pennine Alps, fully 3,000 feet above sea-level. It is about 12 miles long, and only about half a mile wide; lies southwest to northeast, its east side formed by Mont Blanc and other lofty mountains of the same range, and its west side by Mont Brévent and the Aiguilles Rouges. It is traversed in its whole extent by the Arve, which leaves the valley by a narrow gorge at the southwest end, through which also passes, high above the river, the highway to Sallanches and Geneva. At its north end the valley communicates with Canton Valais by two roads and a bridle-path, the latter crossing the Col de Balme; and it may also be left by other passes, as the Col du Géant, but they are difficult and dangerous, and only suited for practised and daring pedestrians. The mountains on the west side of the valley, though attaining a height of 8,500 feet above sea-level, are not covered with snow in summer; but those on the east side, in the

range of Mont Blanc, being from 10,000 to upward of 15,000 feet high, are always snow-clad, excepting where the peaks are too perpendicular for snow to lie. From the snowy range proceed the glaciers, some of which approach close to the cultivated fields. They are very numerous, and of different sizes; but the two most important are the Glacier des Bossons and the Mer de Glace, the latter one of the largest glaciers in the Alps. From its lower extremity, called the Glacier des Bois, the meltings of the glacier flow off, in greater or less volume according to the season of the year, from under a naturally formed ice-arch, the source of the Arveyron, the name given to the stream thus formed, which is an affluent of the Arve. The lower slopes of the mountains are covered with timber, through which is frequently to be seen the devastating course taken by the avalanche. The soil is not fertile, but it is assiduously cultivated; and the inhabitants, who are gathered together in numerous vilages, of which Chamouni or Le Prieuré is the chief, raise barley, oats, spelt, flax, potatoes, etc., raise cattle, and keep bees. During the winter, yarns, cloths, hats, and implements are made, and many articles of wood are carved. All the valley is famous for its scenery, which was first brought to public notice by Windham and Pococke, two Englishmen who visited it in 1741. It presents various points from which the whole mass of Mont Blanc may be seen at one view. The village of Chamouni, 39 miles east-southeast of Geneva, originated in a Benedictine priory founded about 1090. It has several hotels, and is supported mainly by visitors to the scenery of the valley. The ascent of Mont Blanc is most commonly made from this village. There is a monument to De Saussure, who did much to bring the valley before the notice of travelers. Pop. 2,435.

Champ clos shăn klō (Fr. «a closed-in field or area»), formerly a place set apart for duels between those who wished to determine, in that manner, either a lawsuit or dispute of honor. This name was also given to the place set apart for tournaments.

Champ-de-Mars, shăn-dė-mārs, and **Champ-de-Mai,** dė mā, the annual public assembly of the Franks. They were held originally in March and called from the place of meeting Champs-de-Mars; in the 8th century they were transferred by Pepin, the father of Charlemagne, to the month of May, and called the Champs-de-Mai. At the Champs-de-Mai, all questions relating to public affairs, such as war, peace, the enactment of laws, were decided by the majority. These assemblies were held irregularly under the Merovingians, but became more frequent and systematic under the first Carlovingians. Pepin called together only the nobility and the clergy; but Charlemagne ordered that every count should bring with him 13 men from his jurisdiction, to represent the people in the General Assembly. The first descendants of Capet departed from this usage; but Philip IV., who reigned from 1285 to 1314, restored the third estate by calling together delegates from the cities.

The modern Champ-de-Mars in Paris is an extensive area, on the left bank of the Seine, which originally formed a place of exercise for the young men in the military school, and subsequently has been the scene of various public festivals and great gatherings of people. Louis XVI. and his family took part here, in 1790, in the great Fête de la Fédération, in which the king swore to defend the new constitution; in June 1794, it was the scene of the Fête de L'Être Suprême. In 1815 Napoleon selected the Champ-de-Mars for the scene of a general assembly of the French people, at which he placed before the representatives of the nation the articles of a supplementary constitution, called the *Acte additionnel,* intended to establish the legality of his throne. It has also been the site of international expositions of 1867, 1878, 1889, and 1900. See PARIS.

Champac. See CHAMPAK.

Champaigne, Philippe de, Flemish painter: b. Brussels 26 May 1602; d. Paris 12 Aug. 1674. He went to Paris at the age of 19, and worked on the decorations of the Luxembourg under Duchesne; he was later appointed court painter by Marie de Medicis. He was also a member and finally rector of the Academy of Painting and Sculpture. His coloring is excellent and his portraits possess great merit. His best pictures are at Vincennes and at Paris; among them are a portrait of himself, a portrait of Richelieu, 'The Apostle Philip,' and 'The Last Supper,' all in the Louvre.

Champagne, France, an ancient province which before the Revolution formed one of the 12 great military governments of the kingdom. The name Champagne, formerly Champaigne, is derived from the vast plains (Lat. *campus,* «a plain») which occupy the territory. Champagne was bounded on the north by Hainaut and the bishopric of Liége; on the east by the duchy of Luxembourg and Lorraine; on the south by Franche-Comté and Burgundy; and on the west by L'Orléanais, L'Isle de France, and Picardie. It forms at present the departments of the Marne, Haute Marne, Aube, Ardennes, and part of those of the Yonne, the Aisne, Seine-et-Marne, and Meuse. The land is fertile, and produces the celebrated wine called after its name. In the Middle Ages it was a countship of which Troyes was the capital, and was incorporated with France in 1361.

Champagne, shăm-pān'; (Fr. shŏn-pä-ṅyĕ), a French wine made chiefly in the department of the Marne, in the former province of Champagne. It is commonly divided into river and mountain wines (*vins de la rivière de Marne,* and *vins de la montagne de Rheims*), the former being for the most part white, the latter red. Not all of these wines are sparkling or frothing, though by the name «champagne» is generally understood such wine as has been subjected to an imperfect fermentation, and contains a quantity of carbonic acid gas, generated during the insensible fermentation in the bottle, this gas being disengaged on removing the pressure by which it was detained in solution. The briskest wines are not always the best; they are, of course, the most defective in true vinous quality, and the small portion of alcohol which they contain immediately escapes from the froth as it rises on the surface, carrying with it the aroma, and leaving the liquor that remains in the glass nearly vapid. Hence the still or the creaming or slightly sparkling Champagne wines (*vins crémants* or *demi-mousseux*) are more highly valued by connoisseurs and bring greater

prices than the full-frothing wines (*vins grand-mousseux*). By icing these wines before they are used the tendency to effervesce is in some degree repressed; but when they are kept cool this prcaution is unnecessary. In general, it may be observed that the vineyards on the banks of the Marne supply the choicest wines, and that the quality degenerates in proportion as they recede from the river. Among the white wines of Champagne the first rank is generally assigned to those of Sillery, the produce of the vineyards of Verzenay, Mailli, Raumont, etc. Of the Rheims Mountain wines those of Verzi, Verzenay, Mailli, Bouzy, and St. Basle are most esteemed; but the Clos St. Thierry furnishes perhaps the finest red champagne. The soil of the principal vineyards throughout Champagne is composed of a loose marl resting on chalk and sometimes mixed with flints. For the manufacture of the white Champagne wines black grapes are now generally used. In making the red wines the grapes are trodden before they are introduced into the vat. Champagne, when well made, and placed in cool cellars, will retain its good qualities from 10 to 20 years.

Champagny, shäṅ-pän-yē, **Jean Baptiste Nompere** (nŏṅ-pār) **de,** (DUKE OF CADORE), French naval officer, diplomatist and politician: b. Roanne 4 Aug. 1756; d. Paris 3 July 1834. He entered the navy in 1780, and was a member of the States-General, National, and Constituent Assemblies. Thrown into prison in 1793, he was released after the 9th Thermidor (1794), and became councilor of state. He was employed by Napoleon as ambassador to Vienna, and as minister of the interior and of foreign affairs, and he negotiated the marriage with Marie Louise. After Napoleon's downfall he transferred his allegiance to the Bourbons, under whom he became a peer.

Champaign, shăm-pān', Ill., a city in Champaign County, on the Illinois Cent., the Cleveland, C., C. & St. L., and other R.R.'s, 48 miles southeast of Bloomington. It is the trade centre of the richest agricultural county in the State, and has also a number of manufacturing interests. It is the seat of the University of Illinois, and of the Burnham Athenæum and Hospital. Pop. (1900) 9,098.

Cham'pak, chŭm'păk, an East Indian tree (*Michelia champaca*), of the natural order *Magnoliaceæ*. It has large axillary flowers of a deep yellow color, and very fragrant, which are much celebrated in Hindu poetry. The tree is sacred to Krishna, and the women of India adorn their hair with its blossoms. The bark has tonic properties.

Champaran, chŭm-pä-rŭn', India, a district in the province of Behar, in the northwestern part of Bengal, south of Nepal, and east of Oudh; area, 3,531 square miles. The surface is mostly a fertile plain which produces rice, grains, sugar, opium, indigo, etc. Gold is washed down by the rivers from the mountains of Nepal. The climate is very unhealthful. Pop. 1,500,000.

Champe, chămp, **John,** American soldier: b. Loudon County, Va., 1752; d. Kentucky about 1790. He was selected by request of Washington to go to New York as a deserter and spy, and if possible to seize and bring off Arnold in time to save the life of André. Champe undertook the enterprise with courage, passed the American lines with difficulty, was hotly pursued by his comrades as a deserter, reached New York, underwent an examination before Sir Henry Clinton, and by him was consigned to Gen. Arnold, who gave him in the British army his former rank. He discovered the custom of Arnold to walk in his garden at a late hour every night, formed a plan with a comrade to seize and gag him there, and to take him between them as a drunken companion to a boat on the Hudson, whence arrangements were made for his transportation to the American headquarters. On the appointed night Arnold failed to appear in the garden, and Champe, after waiting for him till near morning, returned with deep chagrin to his position in the British army. It proved that Arnold had the day before changed his quarters, preparatory to the embarkation of his troops for Virginia. There was nothing left for Champe but to embrace the first opportunity to escape to the American army, which he did soon after landing in Virginia, and joined the troops under Gen. Greene. Washington discharged him from further service, lest, falling into the hands of the enemy, he should be immediately put to death upon a gibbet. When subsequently Washington sought for him to reward him for his faithful and dangerous service, he learned of his recent death.

Champeaux, Guillaume de, gē-yōm dė shäṅ-pō, French philosopher: b. Champeaux in Brie, about 1050; d. 1121. He was so called from the place of his birth. He studied at Paris under Anselme, De Laon, and Manégolde, and afterward himself opened a school there, in which he had numerous pupils. The schools opened by De Laon and Champeaux are regarded by Pasquier as the origin of the University of Paris. Among the pupils of Champeaux were Robert de Bethune, one of the most distinguished prelates of the age, and still more famous Abelard. He defended the doctrine of realism against the nominalism of Abelard; but it is only in the works of Abelard that any record of their contention remains. Champeaux has left a treatise on the origin of the soul, 'De Origine Animæ,' in which he examines the question how children dying without baptism are justly damned, which he concludes by referring to the unfathomable judgments of God. The only other work of his which has been printed is 'Moralia Abbreviata.' He founded in 1113 the abbey of St. Victor.

Cham'perty, or **Cham'party** (Lat. *campi partitio,* "a division of lands"), in law, a bargain with the plaintiff or defendant in any suit to have part of the land, debt, or other thing sued for, if the party that undertakes the suit prevails therein, the champertor carrying on the party's suit at his own expense. It is a species of maintenance, and is generally held to be illegal both in courts of common law and equity; but in some of the States of this country such agreements are recognized by law, and the tendency is toward freedom of action in these as well as other contracts. See MAINTENANCE.

Champfleury, shäṅ-flė-rē, pseudonym of JULES FLEURY-HUSSON, French novelist and miscellaneous writer: b. Laon 10 Sept. 1821; d. Sèvres 5 Dec. 1889. His story of 'Les Chien-Caillous' was in Victor Hugo's opinion a masterpiece of realistic description. He wrote an

autobiographical novel of his youthful years in 'The Confessions of Sylvius' (1849), continuing the story in 'The Adventures of Mariette' (1856). But his 'Burghers of Molinchart' (1855), a satiric delineation of the provincial bourgeoisie, made him famous. He is a pronounced "realist." Among his later novels 'The Tourangeau Girls' (1864), and 'The Little Rose,' are most worthy of mention. He compiled a 'General History of Caricature' (5 vols. 1865–85), with a supplementary volume, 'Secret Museum of Caricature' (1888); and several other works on the arts of design and ceramics.

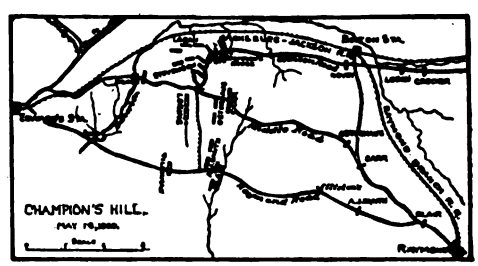
Champier, shäṅ-pē-ā, **Symphorien,** French historian: b. St. Symphorien-le-Loise, Lyonnais; d. Lyons about 1540. Famed as a physician, with powerful friends at court and an ample fortune, he took delight in literature and the society of literary men, himself writing a series of poems for 'Virtuous Ladies' (1503), in four divisions, entitled 'The Flower of Dames,' 'The Rule of Love,' 'The Prophecies of the Sibyls,' and 'The Book of True Love,' respectively. His best history is an account of 'Princes and Battles' (1502).

Champignon, shäṅ-pē-ñoṅ, the French name for the common mushroom (*Agaricus campestris*). See AGARIC.

Cham'pion, chăm'pĭ-ŏn, one who undertakes to defend, in combat or by argument, another person, a doctrine, or a cause. In the rudest state of society men avenge their own wrongs without restraint. The first step commonly made toward a better state of things in the rude beginnings of political society is to confine this right within certain bounds, and allow it to be exercised only with certain formalities. This was done by the feudal institutions of Europe, which recognized in many circumstances, under the toleration of the Church itself, the right of private combat. In some countries, however, particularly in England, the legal recognition of the right of combat had this injurious effect, that the practice became so settled as to be allowed to continue even after more rational ideas had grown up on the subject of the administration of justice. The combat, after it had become a common means of settling disputes, was not always waged by the contending parties. This was the case, indeed, in appeals of felony, and if the heir, either from sex or age, was incapable of "waging his battle," as it was called, the question was left to a more rational mode of settlement. But in the writ of right, the last and most solemn decision respecting real property, the tenant was required to produce his champion, who threw down his glove as a challenge to the champion of the demandant, and the latter, by taking it up, accepted the challenge. The laws authorizing judicial combat, though fallen into disuse, continued to disgrace the English statute-book till 1819. Even the right to the English crown was in some degree put in issue by appeal to judicial combat; and the appearance of a champion offering battle to any one who gainsays the right of the king to the crown was till recently a part of the ceremonial of an English coronation. This office was for four centuries hereditary in the family of Dymoke, of Lincolnshire. The champion's function was to ride into Westminster Hall in full knightly armor, throw down his gauntlet, and proclaim his readiness to defend the title of the sovereign to the crown against any one disputing it. The last exercise of the office was at the coronation of George IV.

The term "champion" is also used in the realm of athletics to designate one who is pre-eminent in a certain branch. More especially is it applied to the foremost boxer, wrestler, or billiard-player, or in the case of the first two sports, to the leader in his class as distinguished by weights, etc. See BOXING. Those pre-eminent in track athletics are usually said to "hold the record."

Champion's Hill, Battle of. On 30 April 1864, Gen. Grant crossed to the east side of the Mississippi River at Bruinsburg, 32 miles in a direct line below Vicksburg. On 1 May he marched to Port Gibson, defeating a Confederate force under Gen. J. S. Bowen. This turned the position at Grand Gulf, and on the 3d Grant reached Hankinson's Ferry; then, after bringing up supplies, marched northeast to interpose between the Confederates, under Gen. J. C. Pemberton, in and near Vicksburg, and those at Jackson, the capital of Mississippi, 40 miles east of Vicksburg. The battle of Raymond was fought and won on the 12th, and on the 14th Gen. Joseph E. Johnston was attacked, defeated, and driven north from Jackson, Grant occupy-



ing the place. Learning from an intercepted dispatch, one of three sent by Johnston to Pemberton, on the 13th, that Pemberton had been advised to march with all his available force on Clinton, 10 miles west of Jackson, and attack Grant's rear, while Johnston operated on his front or flank, Grant, leaving Sherman with two divisions at Jackson to destroy all public property and manufacturing establishments, turned the rest of his army from Clinton, Raymond, and Auburn, on Bolton and Edwards' Station, on the Vicksburg & Jackson R.R., the nearest points where Johnston could unite forces with Pemberton, and at night of the 15th the various divisions were near their designated positions. Pemberton, with the three divisions of C. L. Stevenson, J. S. Bowen, and W. W. Loring, was near Big Black River, on the 14th when he received one of the triplicate dispatches sent by Johnston on the 13th. Anxious to hold Vicksburg and the line of the Big Black, 13 miles east, he questioned the wisdom of acting upon Johnston's suggestion, and called a council of his leading officers, a majority of whom agreed with Johnston; but he adopted the suggestion of Loring and Stevenson, to move on Grant's rear in the direction of Raymond, and advanced on the 15th for that purpose, Loring's division halting at night on the Raymond road at Ellis-ton's, eight miles east of Edwards' Station, the other divisions farther north on roads coming

into the Raymond road. Early next morning the march was resumed, but the head of column had scarcely left camp when Pemberton received a despatch from Johnston that he had been driven north from Jackson, and advising that he move directly on Clinton, and inform him of the movement, that he also might move to that point with 6,000 men. Pemberton concluded to make the movement. He immediately turned back his trains to Edwards' Station to get the road leading to Brownsville on the north, and had scarcely done so, when Osterhaus' and Smith's divisions of Grant's army made their appearance on the Raymond road and attacked his skirmishers, upon which he suspended his movement to join Johnston. Continuing the reversal of his trains to the rear, he formed for battle on the general line of a cross-road, connecting the Raymond and Clinton roads, Loring on the right, covering the Raymond road, Bowen in the centre, and Stevenson on the left, on the northern point of a narrow ridge, known as Champion's Hill, about 60 to 70 feet above the general level of the country, covering the Clinton road and the intersection of the cross-road. Stevenson formed line while heavy skirmishing was going on to his right. Pemberton had about 17,500 men. The position of Grant's army on the night of the 15th was as follows: Hovey's division was at Bolton on the Clinton road; Logan's and Crocker's were on the same road a few miles in Hovey's rear; Osterhaus' was on a cross-road half-way from Raymond to Bolton; Carr's a short distance in his rear; and the divisions of A. J. Smith and Blair were west of Raymond on the Edwards' Station road. These seven divisions numbered about 32,000 men, on the three roads converging on Edwards' Station, and known as the Raymond road on the south, the middle road, and the Clinton road on the north. Early on the morning of the 16th Grant, who was at Clinton, heard that Pemberton was marching to attack him, upon which he sent orders for McPherson, with the divisions of Logan and Crocker, to close up rapidly on Hovey, and for the four divisions under McClernand on the Raymond and middle roads to move forward cautiously and establish communications with each other. He then hastened by the Clinton road to the front. A. J. Smith, advancing on the Raymond road, attacked and drove in Loring's skirmishers about 8 o'clock, and Osterhaus on the middle road engaged those in his front, artillery was brought up and opened fire, but McClernand, who was in command of the four divisions, more than half the army on this part of the field, doubtful if Grant wanted him to bring on a general engagement, deferred attack until 2 P.M., when he received Grant's order to attack, upon which he ordered Smith and Osterhaus to attack vigorously and "press for victory," but the attack was not a vigorous one, and meanwhile the battle was being fought out and decided on the right, on Champion's Hill. Hovey, advancing on the Clinton road began skirmishing with Stevenson about 10 o'clock, and began to form line for a general attack, but was directed by Grant to wait until McClernand could be heard from. Logan came up at 11 o'clock; nothing had been heard from McClernand, and line was formed for a general attack, Hovey south of the Clinton road and Logan on his right. It was about noon when Hovey advanced with great spirit, climbed Champion's Hill, and attacked; finally, after a hard contest with varying success, driving back the right of Stevenson and capturing 11 guns, soon after which Logan, who had worked around on Stevenson's left, on the north side of the hill, attacked and drove back Stevenson's left and captured seven guns. The positions thus gained were held until 2 o'clock. Meanwhile Stevenson, who had been compelled to take ground to the left to meet Logan's flank movement and cover the road to Baker's Creek and Edwards' Station, had induced Pemberton to draw Bowen to the left and close the interval between the two divisions, and Loring was ordered to close in on Bowen. It was after 2 o'clock when Bowen closed in on Stevenson, and his two leading brigades, F. M. Cockrell's and Green's, attacked Hovey furiously and drove him back down the hill, Hovey contesting every foot, but forced to abandon nine of the captured guns. As Hovey fell back two brigades of Crocker's division came to his support, and the Confederates were checked. Artillery was now massed, and poured such an effective enfilading fire upon Stevenson's line that it was much shaken, and Hovey and Crocker again charged up the hill, driving Stevenson and Bowen, after a desperate resistance, before them; and Pemberton, seeing his left entirely broken, at 3 o'clock gave the order for a general retreat, which he ordered Loring to cover. Before this, Loring, leaving Gen. Lloyd Tilghman's brigade on the Raymond road to oppose Smith and Blair, had already with two brigades nearly closed up on Bowen, and when the retreat began was forming his men between the Clinton and Raymond roads, when he was attacked by Osterhaus, and soon gave way, falling back to the Raymond road. Meanwhile A. J. Smith had advanced on the Raymond road, defeated and killed Tilghman. Loring reunited his command and retreated on the Raymond road, but when he came to the ford of Baker's Creek he found it in Union possession, upon which, after vain effort to find a crossing lower down, and realizing that he had been cut off from Pemberton's army, he moved off to the south, abandoning his artillery, and on the 19th joined Johnston, who meanwhile had re-occupied Jackson. Stevenson's and Bowen's men retreated to the Big Black, Grant following as far as Edwards' Station, where darkness ended the pursuit. Grant says he fought the battle with about 15,000 men actually engaged, in four hours of hard fighting, preceded by two or three hours of skirmishes, some of which rose almost to the dignity of battle. The Union loss was 410 killed, 1,844 wounded, and 187 missing. The Confederate loss was 380 killed, 1,018 wounded, 2,441 missing, and 24 guns taken. Grant pursued next day, the 17th, defeated Pemberton at the Big Black, and on the 19th invested Vicksburg. Consult: 'Official Records' (Vol. XXIV.); Greene, 'The Mississippi'; Grant, 'Personal Memoirs'; The Century Company's 'Battles and Leaders of the Civil War' (Vol. III).

E. A. CARMAN.

Champlain, shăn-plăn or shăm-plān', **Samuel de,** French navigator, colonizer, and soldier: b. Brouage, Saintonge, about 1570; d. Quebec 25 Dec. 1635. In early life he served in the army of Henri IV., as quartermaster of

cavalry, but in January 1599 he sailed to the West Indies, Mexico, and Panama. On his return (1601) he prepared a record of this cruise, with charts, etc. In March 1603 he sailed for North America, and explored, by boat, the St. Lawrence River up to the Falls of St. Louis, and down to Gaspè. In May 1604 he sailed with De Monts along the shores of Nova Scotia, wintered on the island of St. Croix, and founded a colony at Port Royal. From 1604 to 1606 he made careful surveys and charts of the coast as far as Cape Cod. He revisited France in 1607, but sailed again in 1608, and founded Quebec, which, owing to the development of its fur-trade, rapidly increased in size. In 1609 he accompanied an Algonquin and Huron expedition against the Iroquois, and thereby discovered Lake Champlain, on the borders of which the Iroquois were defeated. From September 1609 to March 1610 he was engaged in bringing over French mechanics for his colony. He became lieutenant-governor of New France, 8 Oct. 1612; fortified Quebec in 1620; but was compelled in 1629 to surrender to an English fleet, and was taken to England. Released in 1632, he sailed again for New France, with three well-equipped vessels, and spent his last years in the government and development of the French colonies. He published 'Voyages à la Nouvelle France' in 1632.

Champlain, shăm-plān', **Lake,** a body of water chiefly in the United States, between the states of New York and Vermont, but having the north end of it within the Canadian boundary, in the province of Quebec. Its extreme length, north to south, is about 125 miles; breadth, from half a mile to 15 miles; area, about 600 square miles. It is 90 feet above the level of the sea. It was discovered in 1609 by Samuel Champlain, governor of Canada, whence its name. It is navigated by steamboats and other vessels, and is deep enough for ships of the largest class. Its waters are carried northward to the St. Lawrence by the river Richelieu or Sorel, which, in conjunction with the Chambly Canal, affords navigation for large vessels, and forms a well-frequented line of communication. The south end of the lake is connected by a canal with the Hudson River, Lake Champlain thus affording water communication between the St. Lawrence a few miles below Montreal and the Atlantic at New York. Upwards of 50 islands are scattered over its surface; and it receives numerous streams, none of which are very important. The scenery along its sides is picturesque. It abounds in salmon, shad, pike, and other fish; in winter it is usually frozen over. The chief port on its banks is Burlington, Vt. During the wars between the United States and Great Britain, this body of water was the scene of numerous military operations. On 13 Oct. 1776, Benedict Arnold engaged a vastly superior English force, and made a daring escape. On 11 Sept. 1814, the American Commodore McDonough gained, under adverse circumstances, a most brilliant and thorough victory over the English fleet, near Plattsburg. This was one of the earliest substantial successes for the United States in the War of 1812.

Champlain Summer School. See SUMMER SCHOOL.

Champlain Stage, the name given by American geologists to the subsidence that was a feature of the close of the Glacial Epoch in New York, New England, Ontario, and Quebec. At the beginning of the Glacial Epoch the elevation of this section of the continent may have been greater than now, but when the ice-sheet finally retreated the sea extended up the St. Lawrence River nearly to Lake Ontario, and the lower Ottawa River and Lake Champlain were occupied by salt water. The stage is named from the lines of old sea beaches containing whale and walrus bones, thus showing the submergence, typically developed about Lake Champlain. The total amount of the depression varied, being greatest over the St. Lawrence valley. About New York harbor the coast was depressed fully 70 feet; at Albany 355 feet. Along the Maine shore the land was 150 to nearly 300 feet lower than now, and in the St. Lawrence valley the depression was over 500 feet, making allowance for the previous elevation the total depression in the St. Lawrence valley reached 1,500 feet. The climate of Champlain time was probably warmer and moister than that of the present. On the Pacific coast are evidences of depression in the region about Mount St. Elias, shells of Champlain species being found at an altitude of 5,000 feet. See GLACIAL PERIOD; QUATERNARY PERIOD.

Champlin, chămp'lĭn, **James Tift,** American educator: b. Colchester, Conn., 9 June 1811; d. Portland, Maine, 15 March 1882. He graduated valedictorian at Brown University in 1834, and was tutor there, 1835–8. He was a Baptist pastor at Portland, Maine, 1838–41; professor of Greek and Latin, Waterville (now Colby) College, 1841–58; president of the college, 1857–73; professor of intellectual and moral philosophy, 1858–73, when he removed to Portland to devote himself entirely to literary work. He published a large number of school and college text-books, including English, Greek, and Latin grammars, editions of Æschines' and Demosthenes' orations, Tacitus, and Butler's 'Analogy of Religion.' Others are: 'Textbook of Intellectual Philosophy' (1860); 'First Principles of Ethics' (1862); 'Political Economy' (1868); Scripture Reading Lessons' (1876); 'Constitution of the United States; with Brief Comments on the Constitutions of England and France' (1880).

Champlin, John Denison, American author: b. Stonington, Conn., 29 Jan. 1834. He was graduated at Yale in 1856, and admitted to the bar in 1859. In 1864 he became associate editor of the 'Standard,' at Bridgeport, Conn. He afterward published 'The Sentinel' (1865–9) at Litchfield, Conn., and became associate editor of the 'American Encyclopædia' (1875). He is author of 'Young Folks' Cyclopædia of Common Things' (1879); 'Young Folks' Cyclopædia of Persons and Places' (1880); 'Young Folks' Catechism of Common Things' (1880); 'Young Folks' Astronomy' (1881); 'Young Folks' History of the War for the Union' (1881); 'Chronicle of the Coach' (1886); 'Young Folks' Cyclopædia of Games and Sports' with A. E. Bostwick (1890); 'Young Folks' Cyclopædia of Literature and Art' (1901).

Champneys, chămp'nĭz, **Basil,** English architect: b. 1842. He was educated at Trinity College, Cambridge, and after studying archi-

tecture with the architect Prichard, of Llandaff, began the practice of his profession in 1867. Important works of his are the divinity and literary schools of Newnham College, and the Archæological Museum at Cambridge; Indian Institute, Robinson Tower at New College, and Mansfield College at Oxford; Rylands Library in Manchester; Butler Museum at Harrow; and Quincentenary buildings at Winchester College. He is cathedral architect at Manchester. He has published 'A Quiet Corner of England,' a delightful description of Rye and Winchelsea (1875); 'Henry Merritt: Art Criticism and Romance' (1879); 'Coventry Patmore: Memoirs and Correspondence' (1900).

Champney, chămp'nĭ, **Benjamin,** American artist: b. New Ipswich, N. H., 20 Nov. 1817. He went to Boston in 1834, and for three years worked in a lithographic establishment. From 1841 to 1848 he studied painting in Paris and Italy, exhibiting several times in the Paris Salon. He works chiefly in landscape and flower painting, and his White Mountain paintings, which are owned in and around Boston, are famous. Since 1853 he has passed most of his summers at his cottage and studio in North Conway, N. H.

Champney, Elizabeth (WILLIAMS), American writer for young people: b. Springfield, Ohio, 6 Feb. 1850. She was married to J. W. Champney (q.v.), 15 May 1875. Many of her books are illustrated by her husband. Among them are the Vassar Girls' Series, 'Three Vassar Girls Abroad,' 'In England,' 'In South America,' etc.; 'In the Sky-Garden'; 'All Around a Palette'; 'Rosemary and Rue'; 'The Bubbling Teapot'; 'Bourbon Lilies'; 'Sebia's Tangled Web'; 'Romance of the Feudal Chateaux'; 'Fables in Astronomy'; 'Six Boys'; 'Dames and Daughters' Series.'

Champney, James Wells, American artist: b. Boston, Mass., 16 July 1843; d. New York 1 May 1903. He studied in Europe under Edouard Frere, and in 1882 became a member of the National Academy. He excelled in genre pictures and portraits, and exhibited oil paintings at the Columbian World's Fair (1893), and at the Paris (1900) Exposition.

Champollion, Jean François, zhŏń frăn-swä shăn pōl yóń, LE JEUNE, French Egyptologist: b. Figeac, Lot, France, 23 Dec. 1790; d. Paris 4 March 1832. At an early age he devoted himself to the study of Hebrew, Arabic, Coptic, etc. In 1807 he read a paper before the Academy of Grenoble on the ancient Egyptian geographical names, which he endeavored to explain by the Coptic. He then went to Paris, where he continued his Oriental studies, paying particular attention to the Coptic, and endeavoring through it to find the key to the Egyptian hieroglyphics. In 1809 he became professor of history at Grenoble, but soon retired from this post and went to Paris, where he devoted himself almost exclusively to the study of Egyptian antiquities. Assisted by the trilingual inscription of the Rosetta stone he at length discovered the key to the graphic system of the Egyptians, the three elements of which — figurative, ideographic, and alphabetic — he expounded before the Institute in a series of memoirs in 1823. These were published in 1824 at the expense of the state, under the title of 'Précis du Système hiéroglyphique des anciens Égyptiens.' In 1824 he went to Italy, and investigated the collections of papyri and other Egyptian antiquities in the principal cities there. In 1826 Charles X. appointed him to superintend the new department of Egyptian antiquities in the museum of the Louvre. In 1828 M. Champollion went as director of a scientific expedition to Egypt, at the expense of the king. He was admitted a member of the Academy of Inscriptions in 1830. In 1831 the chair of Egyptian archæology was created for him in the Collége de France. His principal works are: 'Grammaire Égyptien,' and 'Dictionnaire hiéroglyphique,' both published after his death. They are indispensable to the student of heiroglyphics.

Champollion-Figeac, fē-zhăk, **Jacques Joseph,** French archæologist, elder brother of the preceding: b. Figeac, Lot, 5 Oct. 1778; d. 9 May 1867. He completed his studies at Grenoble, published his first archæological memoirs in 1803, and was named successively librarian of Grenoble, professor of Greek literature, secretary and dean of the Faculty of Letters of the same town. He took an active part in everything connected with science and letters in the department of the Isère. He acted as secretary to Napoleon in drawing up under his instruction the account of his memorable passage from Elba to Grenoble. In 1828 a place was made for him as keeper of the manuscripts in the Royal Library, and shortly afterward he was installed in the chair of paleography in the École des Charts. He was made an officer of the Legion of Honor in 1866. His principal works are: 'Antiquités de Grenoble' (1807); 'Paléographie Universelle'; 'Annales des Lagides' (1819); 'Traite élémentaire d'Archéologie' (1843); 'Écriture démotique Égyptienne' (1843); 'L'Égypte Ancienne' (1850); besides several other interesting works on Oriental history, and on the language and antiquities of the department of the Isère.

Champs-Elysees, shăńz-ā-lē-zā (Fr. "Elysian Fields"), an avenue in Paris, with its surrounding gardens. It extends from the Place de la Concorde to the Place de l'Etoile, a distance of one and a quarter miles, and is a famous public resort and promenade. It became the property of the crown in 1616 and was ceded to the city in 1828.

Chanca, chăn'ka, **Dr.** (believed to have been DIEGO ALVAREZ CHANCA), Spanish physician: b. Seville; who became a companion of Columbus on his second voyage in 1493. One of the principal authorities for this voyage is the letter which he wrote to the Catholic college at Seville, giving an account of his journey. No record has been kept of his subsequent life.

Chance, SIR **William,** English writer on sociology: b. 1853. He was educated at Harrow and Trinity College, Cambridge, and has been honorary secretary of the Central Poor Law Conference since 1893. He has published 'The Housing of the Working Classes of London' (1895); 'Children Under the Poor Law' (1897); 'Our Treatment of the Poor' (1899).

Chance, in its original and strict meaning, may be defined as that which determines the course of events in the absence of law, ordinary causation, or Providence. Strictly speaking, it is an idea which few men would now be disposed to admit as corresponding to anything

which really exists; the religious mind excluding it as inconsistent with the belief in the divine government, and the philosophical mind rejecting it as inconsistent with a recognition of universal laws of causation. As a word, however, it has always been, and always will be popularly accepted as a term denoting an unknown cause, or a cause so remote that it is overlooked when events are considered superficially and apart from their universal connection.

Chance Acquaintance, A, a story by William Dean Howells, published in 1873. This agreeable and entertaining sketch contains many charming descriptions of the picturesque scenery and places about Quebec.

Chance, Games of. See GAMBLING.

Chance'-Medley, homicide happening either in self-defense, on a sudden quarrel, or in the commission of an unlawful act without any deliberate intention of doing mischief.

Chancel, that portion of a church occupied by the clergy, and often separated from the nave and aisles by screens of carved stone or oak. The screen separating the chancel from the nave is called the rood screen, because anciently a rood or large crucifix was usually placed on it, accompanied with two figures representing Saint John and the Virgin Mary. In the chancel were situated the high altar, the sedilia, or seats for the officiating clergy, and the piscina, in which the water used for washing the hands of the celebrant was poured. It usually contains carved seats or stalls, occupied by the clergy not engaged in the services. These are usually enriched with carvings, and have canopies of carved oak. The chancel occupies the same place with the apsis in the ancient basilicas, and was called so from the *cancelli* or rails used in the early churches to separate the clergy from the laity. The chancel is always at the east end of the church (churches being technically considered as having their major axes extending east and west), and is often constructionally a separate building opening from the nave with a lower roof elevation and raised several steps above the nave. In architecture the term is often employed as synonymous with choir (q.v.).

Chan'cellor, Charles Williams, American physician: b. Spottsylvania County, Va., 19 Feb. 1833. He studied at Georgetown College, and the University of Virginia, 1848–52, and was graduated at Jefferson Medical College, Philadelphia, 1853. During the Civil War he was medical director of Gen. Pickett's division in the Confederate army, 1863–5. He was professor of surgery in and dean of Washington University, Baltimore, 1868–75; secretary of the Maryland State board of health, 1875, president of the Maryland State Insane Asylum, 1880; and United States consul at Havre, France, 1893–7. Among his numerous reports and articles on medical and sanitary topics are the following: 'Report upon the Condition of the Prisons, Reformatories, and Charitable Institutions of Maryland' (1875); 'Contagious and Infectious Diseases' (1878); 'Mineral Waters and Seaside Resorts' (1883); 'Drainage of the Marsh Lands of Maryland' (1884); 'Heredity' (1886) 'Sewerage of Cities' (1886); 'Climate of the Eastern Shore of Maryland.'

Chancellor, Richard, English navigator: d. 10 Nov. 1556. He seems to have been brought up in the household of the father of Sir Philip Sidney, and was chosen in 1553 as captain of the Bonaventure and pilot-general of Sir Hugh Willoughby's expedition in search of a northeast passage to India. The ships were parted in a storm off the Lofoden Islands, and Chancellor, after waiting seven days at Vardöhus, the rendezvous agreed upon, proceeded alone into the White Sea, and traveled thence overland to the court at Moscow, where he was very hospitably treated, and was able to conclude a treaty giving freedom of trade to English ships. His interesting account of Russia was published in Hakluyt's 'Navigations.' Next spring Chancellor rejoined his ship and returned to England, where his hopeful reports led to the establishment soon after of the Muscovy Company. In the summer of 1555 he made a second voyage in the Bonaventure to the White Sea, and was at Moscow once more in the succeeding winter. In July 1556, he set sail on his voyage homeward, but was lost in the wreck of his ship in Aberdour Bay off the Aberdeenshire coast.

Chan'cellor, an officer supposed to have been originally a notary or scribe, under the emperors, and named *cancellarius,* because he sat behind a lattice, called, in Latin, *cancelli,* to avoid being crowded by the people. There are, however, other derivations of this title. Whatever may have been its origin, the office and name of chancellor were undoubtedly known at the court of the Roman emperors, where the title seems to have signified originally a chief scribe or secretary, who was afterward invested with several judicial powers, and with superintendence over the other officers of the empire. From the Roman empire the title and office passed to the Roman Catholic Church, and hence every bishop has to this day his chancellor, the principal judge of his consistory. When the modern kingdoms of Europe were established upon the ruins of the empire, almost every state preserved its chancellor, with different jurisdictions and dignities according to their different constitutions. In all he seems to have had the supervision of all charters, letters, and such other public instruments of the Crown as were authenticated in the most solemn manner, and therefore, when seals came into use, he had always the custody of the king's great seal. This officer has now great authority in all the countries of Europe.

The *Lord High Chancellor of Great Britain (originally of England)* is the first judicial officer of the Crown and exercises an extensive jurisdiction as head of the supreme court of judicature. He ranks as first lay person of the state after the blood-royal. He is always one of the commissioners appointed to represent the sovereign in opening and closing Parliament or giving the royal assent to bills. He is created by the delivery of the great seal into his custody. In like manner the act of taking away the seal by the sovereign formally determines his office. He is a cabinet minister and a privy councilor in virtue of his office, is speaker of the House of Lords by prescription, and vacates his office with the ministry which appoints him. He has a salary of £10,000. He has the appointment of all justices of the peace in the

kingdom, is visitor, in the king's right, of all royal foundations, and patron of all Crown livings under the value of 20 marks in the king's books. The office having in early times been always filled by ecclesiastics (for no others were then capable of an employment requiring so much writing), he became keeper of the king's conscience; and by special appointment he now exercises a general superintendence as guardian over all infants, idiots, and lunatics, though these latter powers are not necessarily attendant on his office, as Blackstone seems to have imagined, but can be delegated by the Crown to any other judicial officer, as in fact they were delegated even as late as the reign of James I., when the seals were held by Dr. Williams, then dean of Westminster, and afterward bishop of Lincoln. The great seal has been not unfrequently put in commission, and was last so on the resignation of Lord Thurlow in the year 1793. One vice-chancellor was appointed to preside in the courts of equity by 53 George III., c. 24, and two by 5 Vict. c. 5, § 19. The two last-mentioned were at first subordinate vice-chancellors, but they were afterward all made of equal rank. They sat in separate courts, and an appeal lay from their decisions to the lord chancellor. They latterly sat in the chancery division of the supreme court of judicature. See CHANCERY; SUPREME COURT OF JUDICATURE.

Chancellors of Ireland and Scotland.— There is a lord high chancellor of Ireland, who is the head of the judical bench, with a salary of £8,000. He is not a member of the British ministry. The chancellorship of Scotland was abolished at the union. The Scottish chancellor had no independent jurisdiction in equity, as there has never been a separate court of equity in Scotland; but he presided in Parliament, and was head of all the courts of judicature, and of the Scottish office of chancery, in which all charters and other writs appointed to pass the great seal were recorded. This office still exists under a director of chancery.

The *Chancellor of the Exchequer* is the principal finance minister of the government, and as all questions of supply originate in the House of Commons, a peer cannot be conveniently appointed to this office. When the first lord commissioner of the treasury is a commoner, the two offices have sometimes been united.

The *Chancellor of the Duchy of Lancaster* presides in the court of the duchy chamber, to decide questions relating to lands holden of the king as Duke of Lancaster; but it does not appear that this is a court of record. The chancellorship is generally bestowed during pleasure, though there are two instances of its being granted for life; the last being that of the celebrated Lord Ashburton. The Chancellor of the Duchy of Lancaster is a cabinet minister.

The *Chancellor of a University* is an official at the head of the university, generally a man of rank, whose duties are more or less nominal, but who is regarded as conferring the degrees. At Oxford his duties are almost entirely discharged by the vice-chancellor; the chancellor's own acts being limited to the signing of diplomas, etc. Under the vice-chancellor are four pro-vice-chancellors, nominated by him from among the heads of colleges, to one of whom, in his absence from the universty, he delegates his authority. The chancellor of Cambridge University, whose duties are very similar to those of the Oxford official, is elected biennially by the Senate; but there is no instance, at least in modern times, where a re-election has not taken place.

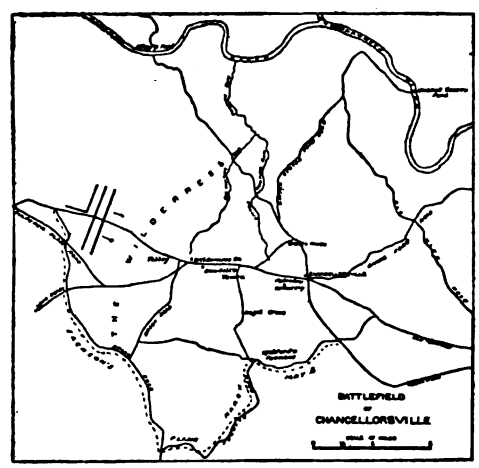
Chancellor of the Order of the Garter and Other Military Orders, an officer who seals the commissions and the mandates of the chapter and assembly of the knights of the order, keeps the register of their proceedings, and delivers their acts under the seal of their order. The title "chancellor" is given, in England, to several officers of other bodies.

Chancellors of Other European Countries.— The chancellor was one of the highest officers in the German states, and by the influence of his office was one of the most important. In Germany this dignity was from the remotest times vested in one of the higher clergy, until the head of the German clergy, the Archbishop and Elector of Mainz, united it forever with his office as Arch-chancellor of the empire. The two other spiritual electors held the same dignity, but it was merely titular; the Archbishop of Cologne, as Arch-chancellor of Italy; the Archbishop of Trèves, as Arch-chancellor of Gaul and Arles, that is, the kingdom of Burgundy, once belonging to Germany. The Arch-chancellorship of Mainz, on the contrary, had important duties attached to it — the direction of the Diet and of the public business, as well as of all the imperial chanceries. The Elector appointed a vice-chancellor, who was the actual minister of the empire at the imperial court. In the new German Empire the chancellor (*Reichskanzler*) is the president of the Federal Council (*Bundesrath*), and has the general conduct of the imperial administration. All laws of the empire, after being sanctioned by the emperor, must be countersigned when promulgated by the chancellor.

The Chancellor of France was the highest officer of state, and the only one who, when once appointed, could not be dismissed. In case, therefore, it was desired to remove him from participation in affairs, a keeper of the seals (*garde des sceaux*) was appointed. As the chancellor was properly the minister of justice, he was chosen from the body of jurists. A relic of his spiritual character was, that all his furniture, liveries, and even his coach, were black.

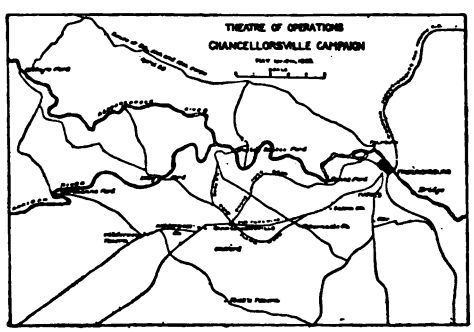
Chan'cellorsville, Battle of. The Chancellorsville campaign included the battle of Chancellorsville, 1–3 May 1863, the action at Marye's Heights, 3 May 1863, and the engagement at Salem Church, 3 and 4 May 1863. In the fore part of April 1863 the Army of the Potomac, under Gen. Hooker, and the Army of Northern Virginia, Gen. Lee, confronted each other on opposite sides of the Rappahannock at Fredericksburg. Lee was so strongly entrenched on the south side of the river from Port Royal on the right to Banks' Ford on the left, a distance of 25 miles, that an attack on his front was not to be thought of, and Hooker concluded to march his cavalry far beyond and around Lee's left, destroy his communications with Richmond, and compel him to leave Fredericksburg, when he proposed to fall on his flank and rear as he fell back. For this purpose Gen. Stoneman with 10,000 cavalry was put in motion, 13 April, under orders to ascend

the Rappahannock, cross it west of the Orange & Alexandria R.R., attack Lee's cavalry wherever found, and plant himself firmly across his line of retreat. Stoneman found the Rappahannock and other streams so swollen by heavy rains that he was compelled to abandon the movement, and Hooker modified his plans. He determined to flank Lee's position and compel him to come out and fight on open ground of Hooker's own choosing. Lee had, in and around Fredericksburg, exclusive of cavalry, about 60,000 men and 170 guns; the two divisions of McLaws and R. H. Anderson of Longstreet's corps, and Jackson, with the divisions of A. P. Hill and D. H. Hill, commanded by R. E. Rodes; Trimble, commanded by R. E. Colston and J. A. Early. Hooker had, not including his 12,000 cavalry, about 118,000 men and 380 guns, divided into seven corps: First, Gen. J. F. Reynolds; Second, D. N. Couch; Third, D. E. Sickles; Fifth, Geo. G. Meade; Sixth, John Sedgwick; Eleventh, O. O. Howard; Twelfth, H. W. Slocum. Both armies were in the best of condition. On the 27th the Eleventh and Twelfth corps marched for Kelly's Ford, 25 miles up the Rappahannock, arriving on the 28th, and being joined by the Fifth corps, all crossed the river next morning, the Eleventh and Twelfth corps marching for Germanna Ford on the Rapidan, the Fifth corps for Ely's Ford, lower down the same stream. Pleasanton's cavalry brigade accompanied the two columns. Some opposition was met at the fords, and at 2 P.M. of the 30th, after some sharp encounters with Stuart's cavalry, on the Germanna road, the three corps united at Chancellorsville, 11 miles west of Fredericksburg, and were joined the same day by two divisions of the Second corps, under Couch, which had crossed the Rappahannock at United States Ford, the Third corps also being near. The cavalry was thrown out on the roads toward Fredericksburg and Spottsylvania. Hooker had concentrated with great ability 71,000 men on Lee's left and joined them before night. Mahone's and Posey's brigades of Anderson's Confederate division had been guarding United States Ford; the passage at Germanna Ford turned this position, and the two brigades on the 29th fell back to Chancellorsville, where Anderson had come up with Wright's brigade. Next morning Anderson fell back with the three brigades to near Tabernacle Church, four miles, and began to throw up works covering the roads converging at that point. These movements on Lee's left were covered by demonstrations on his right and front below Fredericksburg. They began as early as the 21st, and on the 29th Sedgwick, with the First, Third, and Sixth corps, moved to points two to four miles below town, threw pontoon bridges across the river, and crossed troops to hold them. On the 30th he was ordered to demonstrate on Lee's right down the river, and the Third corps marched by the north bank of the river for Chancellorsville. Sedgwick's movements did not deceive Lee. On the afternoon of the 29th Stuart had informed him that heavy Union columns were marching for the Rapidan, and he ordered Anderson to march with Wright's brigade to Chancellorsville. When informed that Hooker had crossed the Rapidan he ordered McLaws, leaving Barksdale's brigade on Marye's Heights, to march with three brigades, at midnight of the 30th, and take position on Anderson's right. Jackson was ordered with three divisions to Chancellorsville, leaving Early's division with Barksdale's brigade — in all, about 8,500 men, and 30 guns — to hold the lines at Fredericksburg against Sedgwick. McLaws arrived on Anderson's right about daylight, and was joined by two of Anderson's brigades from near Banks' Ford. Jackson marched at 3 o'clock on the morning of 1 May, and came up to Anderson at Tabernacle Church at 8, suspended work on the entrenchments and, at 11 o'clock, ordered McLaws and Anderson forward on the two roads leading to Chancellorsville, his own three divisions following Anderson. Three roads lead from Chancellorsville to Fredericksburg, the most direct, the old turnpike, passing Salem Church. The second, the plank road, led south from Chancellorsville, then east, uniting with the turnpike beyond Tabernacle Church. Both these roads were covered by Anderson's works. The third road led northeastward, passed Banks' Ford, about six miles distant, and continued to Fredericksburg. It was 11 o'clock, 1 May, when Meade pushed out two divisions on the Banks' Ford road and one, Sykes', on the turnpike, under orders to



be at or near Banks' Ford at 2 P.M., and at the same hour, 11 A.M., Slocum advanced on the plank road, to be at Tabernacle Church at noon, Hooker's intention being to get out of the Wilderness, uncover Banks' Ford, and form for battle in open, elevated country, his right at Tabernacle Church, his left covering Banks' Ford. Meade's left divisions had come in sight of Banks' Ford; Sykes, supported by Hancock's division, Second corps, had encountered McLaws and driven him back nearly to Anderson's works; Slocum, over two miles out, had met Jackson and was sharply skirmishing with him; and all was going well, when Hooker, impressed by the unexpected advance of the enemy, and fearing his own inability to get entirely out of the tangled forest, onto open ground, before being beaten in detail, ordered the columns back to Chancellorsville, thereby giving up the advantage of position practically gained and losing the confidence of his corps commanders. Jackson and McLaws followed the retiring troops and felt the lines with skirmishers, and McLaws got guns in position and cannonaded the left of the line. Hooker's line,

as completed on the morning of the 2d, extended from the Rappahannock on the left to a point on the Germanna plank road full two and a half miles west of Chancellorsville. The Fifth corps and a division of the second was on the left, facing east, the right in advance of the Chancellor House. The Twelfth corps was south of the plank road, its left less than one fourth of a mile in front of the Chancellor House, its right near Hazel Grove, a little over a mile southwest of Chancellor's. Birney's division of the Third corps was on the right of the Twelfth, and the Eleventh corps continued the line from Dowdall's tavern westward beyond Talley's farm. The works held by the Twelfth, Third, and Eleventh corps faced south, those of the Twelfth in form of a bow, the plank road being the string of the bow; those of the Eleventh ran in a straight line generally just south of the road. For nearly the entire distance the line ran through an almost impenetrable forest of scrub-oak and pine. There was a spacious clearing around the Chancellor House, where Hooker had his headquarters, and open ground around Dowdall's. A division of the Second corps and two of the Third were in reserve. Pleasanton's cavalry was near



Chancellor's House. On the evening of 1 May Lee had a conference with Jackson. To attack Hooker's 71,000 men, behind works, with 48,000, was certain to entail a terrible loss of life, and it was determined that Jackson, with nearly 30,000 men, infantry, cavalry, and artillery, should march across Hooker's front and assail his right flank and rear, Lee remaining with McLaws' and Anderson's 18,000 men to watch his left, demonstrate on it, and guard the roads to Fredericksburg. Jackson moved on the morning of the 2d with his accustomed celerity, and about 4.30 P.M. his head of column was on Hooker's right and rear, and he began to form line a scant mile from the right flank of the Eleventh corps. His movement had been discovered and misunderstood. As early as 9 o'clock he was seen marching a mile or so to the south; information of the fact was sent to Slocum and Howard, and instructions to both to strengthen their flanks. Hooker soon came to the conclusion that Lee was retreating, and about 1 P.M. Sickles, at his own request, was ordered to take two divisions of the Third corps, move out and attack, which he did, falling on Jackson's rear at Welford's Furnace, taking some prisoners. Barlow's brigade of the Eleventh corps was sent to Sickles, and Pleasanton's cavalry joined him, but the forest was too dense for cavalry operations, and Pleasanton withdrew two of his regiments and battery to Hazel Grove, where Sickles had left some of his artillery. Williams' division of the Twelfth corps was sent from its works to form on Sickles' left, attack Anderson's left and roll him back on Chancellorsville. Williams was about to attack when Jackson fell on the flank of the Eleventh corps, and he went back to his works. The Eleventh corps was badly posted and, though repeatedly informed by brigade and regimental commanders and picket officers of the gathering enemy on the flank, the superior officers, with one exception, lulled into security by the pleasing reports that Jackson was retreating, made no adequate provision against a flank attack, and most of the men were preparing supper when the storm broke. Jackson had formed his 26,000 infantry in three lines across the plank road, a mile on either side of it, artillery in the road, and a little after 5 o'clock gave the order to advance. The lines advanced with a rush, startling the game in the forest. The Union skirmishers were quickly driven in, and with a wild yell the main Confederate line struck the right brigade of Devens' division, flanked it, and after two or three rounds had been fired it gave way, the enemy following, striking and flanking everything in the way. No troops in the world, so placed, could stay such an attack. Some regiments made heroic stand and fought brilliantly, but in 30 minutes Deven's division of 4,000 men, was routed and the Confederates advanced upon Schurz's division, which had changed front. Schurz held ground about 20 minutes, and then fell back upon Buschbeck's brigade, east of Dowdall's. Here Schurz rallied some of his men. Buschbeck stood three quarters of an hour, and it was after 7 o'clock, when, attacked in front and flank, he fell back in good order to Fairview, where 40 guns of the Eleventh and Twelfth corps were being massed on high ground in his rear. Howard's corps had been driven two miles in less than two hours, losing nearly 1,500 killed and wounded, and 1,000 prisoners. The force of Jackson's attack had spent itself; his two leading divisions — Rodes' and Colston's — had become inextricably mixed; the men were tired and hungry, and Jackson suspended their further advance and ordered A. P. Hill to relieve them. Meanwhile Hooker had sent Berry's division, of the Third corps, and Hays' brigade, of the Second, to the west edge of the open field north of the road; on Berry's right were some of Schurz's regiments; and Williams, desisting from his attack on Anderson, regained part of his works and formed south of the road on Berry's left, Buschbeck in his rear. This covered the road at a distance of a little over a half mile west of Chancellor's House. Sickles, when informed of Howard's disaster, fell back from Welford Furnace to Hazel Grove, and formed on Pleasanton's left. Barlow drew up in Pleasanton's rear, all close to Williams' left and front. The two Confederate lines fell back to the open ground around Dowdall's, to re-form, and A. P. Hill was brought up and his leading brigade pushed along the plank road beyond the intersection of a road leading left to White House, and United States Ford, the road to be taken by Hill to cut off Hooker's retreat. While Jackson was reconnoitering on this road, beyond his main line, skirmishing began between the opposing pickets in the woods, and as

Jackson, with his staff and orderlies, was riding back, the mounted body was mistaken for Union cavalry, and fired into, Jackson (about 9.20 P.M.) was wounded in three places, both arms being shattered. Nearly the entire escort were also killed or wounded. Jackson died 10 May. At the sound of the firing in the woods the Union guns on Fairview opened a furious fire down the plank road, causing some confusion to the Confederate column on it. During this fire A. P. Hill, next in command, was wounded; the intended advance was suspended, and Gen. J. E. B. Stuart was sent for to take command. During the night and early morning some changes were made in the Union line by which the approaches on the right to United States Ford were covered by Reynolds' corps and part of Meade's, and the Eleventh corps took position on the extreme left vacated by Meade. At 9 P.M. Hooker, not knowing that Sedgwick's entire corps was at Fredericksburg, ordered him to cross from Falmouth and march up the south side of the river to Chancellorsville, and attack Lee's rear at daylight, 3 May, while he attacked in front. Pleasanton and Sickles were ordered to fall back from Hazel Grove at dawn. Pleasanton marched back at 4 o'clock, and Sickles was following when his rear was caught by the oncoming Confederate line. Stuart, who had assumed command of Jackson's corps, advanced at 5 o'clock, 3 May, with great impetuosity, his right attacking Sickles as his rear brigade was about retiring from Hazel Grove. The brigade was soon driven, four guns were captured, and Stuart swept on. Thirty Confederate guns were put in position at Hazel Grove which swept the open ground of Fairview and poured an enfilading fire on the right of Geary's division of the Twelfth corps, which was fighting Anderson, and at the same time Geary's left was being pounded by McLaws' guns. The battle now became fierce along the entire line of the Second, Third, and Twelfth corps. On the right Stuart's men fought French's division of the Second corps and the three divisions of the Third, taking the Union works, being driven from them, and retaking them. Williams was fighting Stuart's right, Geary of the Twelfth corps was desperately engaging Anderson, and on his left, covering Fredericksburg road, Hancock's division of the Second corps was resisting the fierce attacks of McLaws. Stuart gradually gained ground and united his right with Anderson's left near Hazel Grove. The Union ammunition began to fail, and finally, about 9 o'clock, French, of the Second corps, the Third corps, and Williams' division of the Twelfth, after frightful losses, began to fall back, and the Confederates gained the west of the Chancellor plateau and swept it with artillery. A cannon-shot struck a pillar of the Chancellor House against which Hooker was leaning. He was knocked down and stunned, and Couch, who was second in command, was instructed by Hooker to withdraw to a position, already selected, about three fourths of a mile north of the Chancellor House, and covering United States Ford. The right and centre, closely pressed, fought their way back; Geary, attacked in front, right flank, and rear, followed; Hancock followed Geary; before noon the troops were in the new position; and here the battle of Chancellorsville proper ended, for, before Lee had completed preparations to renew his attack, he heard of the capture of Fredericksburg and Marye's Heights and the advance of Sedgwick. Suspending further operations against Hooker, he turned his attention to Sedgwick, sending McLaws' division to oppose him.

When Sedgwick received Hooker's order of 9 P.M., 2 May, to cross the river at Fredericksburg, he had already done so and was three miles below the town. It was 11 P.M. when he received the order; he had 14 miles to march before he could reach Chancellorsville; and an enemy barred the way. He had about 23,000 men. His three divisions were commanded by Gens. John Newton, W. T. H. Brooks, and A. P. Howe. Brooks was left below Fredericksburg, and Newton led the advance on the town. The night was dark; progress was slow; frequent halts being made while the skirmishers were feeling the way; it was the gray of the morning when Newton reached the rear and left of Fredericksburg; and as daylight came Marye's Heights were seen to be held by the enemy. Gibbon crossed the river from Falmouth and reported to Sedgwick with his division, and under cover of a demonstration by Newton, advanced on the right to turn the position, but was stopped by the canal and a concentrated fire of artillery. He found also that Hays' brigade of Early's division, and Wilcox's of Anderson's were in his front, and he was obliged to fall back. On the other flank Howe's division failed to make an impression. Nothing remained but to assault the heights, and storming columns were formed, Howe forming three on the left, and Newton, two, of two regiments each, strongly supported. These were launched against the Confederate position, and were bloodily repulsed by Barksdale's brigade. The assault was renewed and Marye's Heights carried about 11 o'clock, with a loss to Sedgwick of nearly 1,000 killed, wounded, and missing, in a very few minutes. He took 15 guns and nearly 1,000 prisoners. Here a delay occurred to get Brooks' division up, which was to take the advance, and it was 3 o'clock before Sedgwick marched for Chancellorsville, leaving Gibbon to hold the town and cover the bridges there. His march was impeded by Wilcox, who had regained the road in his front and made a stand half a mile in advance of Salem Church, where McLaws had now come up and formed across the road. Brooks' division advanced and Wilcox fell back to the church, Brooks closely following, and a desperate encounter raged around the church, in which at first Brooks, supported by Newton, was successful, but was finally compelled to fall back after losing 1,500 men. Dispositions were made to renew the struggle, but night came and both sides slept on their arms. Early, who had concentrated his command at Cox's, on the telegraph road, south of Fredericksburg, had Lee's permission to attack Marye's Heights and Sedgwick's rear at daylight. He was joined by Barksdale and, as Marye's Heights were held by a small Union force, his attack succeeded. Leaving Barksdale to hold the heights and prevent an advance of Gibbon, who was in the town, Early moved toward Salem Church and asked McLaws to co-operate with him. Meanwhile Lee, retaining only Jackson's three depleted divisions to confront Hooker at Chancellorsville, led Anderson to unite with McLaws and Early, and drive

Sedgwick across the Rappahannock, the three divisions aggregating about 21,000 men. Anderson arrived about noon of the 4th, and took position betweeen McLaws and Early. Sedgwick was now hemmed in on three sides, his line in shape of a horseshoe, both flanks on the river covering Banks' Ford. The line was five or six miles in length, Newton, on the right, facing McLaws on the west; Brooks, in the centre, facing south, confronting Anderson, and Howe, on the left, facing east, opposing Early. Skirmishing was kept up during the day, and at 6 o'clock, Lee, after reconnoitering the position, ordered an attack to break the centre. Newton was not seriously attacked, but Howe and Brooks were assailed with great spirit, Early, falling upon the former and endeavoring to turn his left, in which he did not succeed, two of his brigades being repulsed and thrown into confusion by Howe's artillery. An attack on Howe's right and Brooks' left was also repulsed. The Confederates continued the contest until darkness put an end to it. Sedgwick then withdrew from the field to Banks' Ford, where he was covered by 34 guns on the north side of the river, but he had lost so heavily and was hemmed in so closely that, with Hooker's approval, he crossed the river during the night, taking with him nine captured guns and about 1,400 prisoners. His loss, since crossing the river on the 2d, had been 3,200 killed and wounded and 1,500 captured. During the night Gibbon recrossed the river to Falmouth, and on the morning of the 5th Lee was again in full possession of the south side of the river below Chancellorsville. Early was left to hold Fredericksburg, and Lee marched back with McLaws and Anderson to renew the battle with Hooker. A heavy storm came up, converting dry ravines into torrents and the soil to deep mire, and the attack was deferred until next morning. When day came Hooker had recrossed the river at United States Ford, and the Army of the Potomac marched to its old camp, and Lee returned to his old position at Fredericksburg. The Union loss at Chancellorsville was 1,082 killed, 6,849 wounded, and 4,214 missing. Including the losses at Fredericksburg, Marye's Heights, and Salem Church, the Union loss in the entire campaign, 27 April to 5 May, was 1,606 killed, 9,762 wounded, and 5,919 missing; an aggregate of 17,287. The Confederate loss during the campaign was 1,665 killed, 9,081 wounded, and 2,018 captured; an aggregate of 12,764. Consult: 'Official Records,' Vol. XXV.; Hotchkiss and Allan, 'Chancellorsville'; Abner Doubleday, 'Chancellorsville and Gettysburg'; S. P. Bates, 'The Battle of Chancellorsville'; T. A. Dodge, 'The Campaign of Chancellorsville'; A. C. Hamlin, 'The Battle of Chancellorsville'; The Century Company's 'Battles and Leaders of the Civil War,' Vol. III.

E. A. CARMAN.

Chancery, formerly the highest court of justice for England and Ireland. It obtained its name from being under the presidency of the lord chancellor. It embraced six superior courts called high courts of chancery, and numerous inferior courts. The superior courts were the court of the lord high chancellor, the court of the master of the rolls; the court of appeal in chancery, constituted by the lord chancellor sitting along with either of the two lords justices in appeal or by the two lords justices sitting together apart from the lord chancellor; and the courts of the three vice-chancellors. The ordinary legal jurisdiction of chancery embraced the issuing of writs for a new Parliament; of pleas of *scire facias* to repeal letters patent, and of all original writs. There was also a jurisdiction acquired by statute or special delegation in issuing writs of habeas corpus and inquiring into charitable uses. There were numerous other powers conferred by act of Parliament, and the lord chancellor, together with the lords justices of appeal, had exclusive authority over the persons and property of idiots and lunatics. Appeals in bankruptcy were heard by the court of appeal in chancery. The sittings and business of this court of appeal were regulated by the lord chancellor.

The procedure of the court of chancery at one time, by reason of its traditions and forms (commonly known as "red tape") became so cumbersome as partially to defeat its own ostensible aims, and rendered reform imperative. Charles Dickens made a determined attack upon the delays of chancery practice in his 'Bleak House,' and subsequent changes have been commonly attributed to his influence.

The English court of chancery is now a division of the high court of justice, which is itself one of the two departments of the supreme court of judicature (q.v.). The present judges of chancery, as a division of the high court of justice, are the lord chancellor, who presides over the division, and five justices, each of whom has the title of "Sir" and receives a salary of £5,000. According to the provisions of the act by which the supreme court of judicature was established, there were to be no more judges appointed than were already connected with the court; and the distribution of business, both as to its commencement and its transfer, was made subject to rules of court and orders of transfer. By the operation of these provisions chancery, like the other divisions of the court to which it now belongs, was gradually to cease to be a separate department; but in the meanwhile, subject to these rules and orders, certain causes and matters were assigned to chancery until these provisions should take their full effect. These are enumerated in the Supreme Court of Judicature Act (36 & 37 Vict. c. 66, § 34), and are (1) all causes and matters pending in the high court of chancery at the commencement of the act (finally fixed for 1 Nov. 1875); (2) all causes and matters to be commenced after the commencement of the act under any act of Parliament by which exclusive jurisdiction in respect to such causes or matters has been given to the court of chancery, or to any judges or judge thereof, except appeals from county courts; (3) all causes and matters for the administration of the estates of deceased persons; for the dissolution of partnerships or the taking of partnership or other accounts; for the redemption or foreclosure of mortgages; for the raising of portions or other charges on land; for the sale and distribution of the proceeds of property subject to any lien or charge; for the execution of trusts, charitable or private; for the rectification or setting aside or cancellation of deeds or other written instruments; for the specific performance of contracts between vendors and purchasers of real estates, including

contracts for leases; for the partition and sale of real estates; for the wardship of infants and the care of infants' estates. Chancery, as a division of the high court of justice, has no exclusive right to the administration of equity, the act already mentioned making provision under certain rules for the concurrent administration of law and equity in all the divisions of the supreme court of judicature. The court of appeal in chancery no longer exists, and its functions are transferred to the court of appeal, which in the new supreme court of judicature is the complementary department to the high court of justice. The affairs of lunatics are still under the supervision of the lord chancellor.

In the United States the general tendency has been likewise to abolish courts of chancery as separate departments, and equity jurisdiction is generally conferred on the courts of law. Delaware, New Jersey, and Tennessee are among the few States that still retain the former practice.

Chancre, shăngk'ẽr, two forms of venereal disease which go by this name: hard chancre, the initial lesion of syphilis (q.v.); and soft chancre, or chancroid (q.v.).

Chancroid, shăngk-roid, a contagious venereal disease characterized by the presence of one or more, often several, suppurative ulcers, chiefly located in the genital regions. These are due to infection by the organisms of dirt and are not true syphilitic lesions. Very frequently both hard and soft chancres are communicated at the same time, but they can be distinguished, although it has been only within the last 50 years that a definite line has been drawn between these two varieties of venereal disease. Chancroid is definitely a dirt disease, and is due to uncleanliness as well, perhaps, as to a specific micro-organism. Chancroid usually develops, within 24 to 48 hours after infection, as a minute macule, or pin-point vesico-pustule surrounded by a reddish halo. This increases day by day until a pustule or ulcer about the size of a small coin is developed. This ulcer is usually a soft ulcer. There is not much induration in the connective tissue beneath it, which is one of the distinguishing features between it and true syphilitic chancre. Chancroids are usually multiple, whereas chancres are usually single. They persist usually from three to six weeks and are often very difficult to cure, and furthermore a patient with chancroid may reinfect himself and thus spread the lesion at times very widely.

Chanda, chŭn'dä or chän'dä, India, chief town of the district of Chanda in the Nagpur division of the Central Provinces. It is surrounded by a stone wall five and a half miles in circuit, inside which are cultivated fields and detached villages, while there are also suburban quarters outside. There is a citadel now inclosing the jail, tomb of the Gond kings, three interesting temples, massive monoliths, etc. The town has a public park, civil station, and military cantonments. The manufactures include cottons, silks, brass utensils, etc. There is an annual fair beginning in April and lasting three weeks. Pop. 16,000.

Chandausi, chŭn- or chän-dow-sē', India, a town in the Northwestern Provinces, 27 miles south of Moradabad. It is the centre of a considerable trade, especially in sugar and cotton, and has limestone quarries. Pop. 29,000.

Chandeleur (shăn-dė-lėr) **Islands** lie east of Chandeleur bay, on the southeast coast of Louisiana. On the northern or smaller island is a fixed white light.

Chanderi, chŭn- or chän-da'rē, or **Chandhairee,** India, a town of Scindia's Dominions (Gwalior), Central India, 105 miles south of the town of Gwalior. It contains many ruins showing its former greatness and magnificence, but is now an insignificant place. The fort, which figures much in the wars of the Mogul dynasty, is on a hill, enclosed by a stone rampart, flanked with circular towers. Pop. 6,000.

Chandernagor, chŭn-dėr-nŭ'gōr or chăndėr-na'gōr, or **Chandarnagar,** India, a town on the right bank of the Hooghly, 16 miles north-northwest of Calcutta. Its only manufacture is of cotton cloth, and there is no trade but with Calcutta. The French established a factory there in 1676, and in 1688 obtained a formal cession of it, together with its territory of about three and a half square miles, from Aurungzebe. It was three times taken by the British, first in 1757, but finally restored to the French in 1816. Chandernagor is under a subgovernor, subordinate to the governor of Pondicherry. Pop. of town and territory 26,000.

Chand'ler, Abiel, American merchant: b. Concord, N. H., 1778; d. Walpole, N. H., 22 March 1851. He was graduated at Harvard College in 1806, and was for many years a merchant in Boston. He died a widower, without children, and devised $50,000 to Dartmouth College. The Chandler School of Science at Dartmouth was established in 1851 in pursuance of this bequest. For many years it was maintained as a separate department, but has recently been formally incorporated into the college and it is now known as the Chandler scientific course leading to the degree of bachelor of science.

Chandler, Charles Frederick, American chemist: b. Lancaster, Mass., 6 Dec. 1836. He studied at the Lawrence Scientific School of Harvard College, and at the universities of Berlin and Göttingen, receiving his doctor's degree at the latter in 1856. He was professor of chemistry in Union College, 1857–64, and professor of analytical and applied chemistry in the Columbia College School of Mines, 1864–1903. In 1858 he was elected to the chair of chemistry in the New York College of Pharmacy, and in 1876 to the chair of chemistry and medical jurisprudence in the College of Physicians and Surgeons. He became chemist to the Metropolitan Board of Health in 1865, and its president in 1873, being instrumental in securing great reforms in connection with the sanitary condition of the markets and the purity of the food-supply, notably in the case of milk. He is a member of the chemical societies of Berlin, London, and Paris, and of the National Academy of Sciences. With his brother, Prof. W. H. Chandler, he founded the 'American Chemist,' a monthly journal devoted to chemical science. To this and to the annual reports of the New York health department he has contributed many papers on chemistry, water-supply of cities, purification of coal gas, on petroleum, milk, sorghum, and glucose.

Chandler, Elizabeth Margaret, American poet: b. near Wilmington, Del., 24 Dec. 1807; d. 22 Nov. 1834. Her most popular poem was 'The Slave Ship.' Many of her subsequent verses were written in the same strain, and published in the 'Genius of Universal Emancipation,' a Philadelphia abolitionist periodical. Her poems were published with a memoir by Benjamin Lundy (1836).

Chandler, Frank Wadleigh, American writer: b. Brooklyn, N. Y., 16 June 1873. He graduated at the Polytechnic Institute of Brooklyn, 1894; studied literature and philosophy at Columbia University, and at Oxford, London, and Paris, 1895–9. Since 1899 he has been professor of literature and history in the Polytechnic Institute, and since 1901 lecturer in comparative literature at Columbia. He has written 'Romances of Roguery, an Episode in the History of the Novel' (1899), and 'Some Theories of the Novel's Evolution in East and West' (1900).

Chandler, Richard, English archæologist: b. Elson, Hampshire, 1738; d. Tilehurst, Berkshire, 9 Feb. 1810. He was educated at Winchester and at Queen's and Magdalen colleges, Oxford. His first important work was 'Marmora Oxoniensia' (1763), an elaborate description of the Oxford marbles. He afterward traveled through Greece and Asia Minor, with Revett, architect, and Pars, a painter, at the expense of the Dilettanti Society, to examine and describe the antiquities. The materials collected were given to the world in the following publications: 'Ionian Antiquities' (1769); 'Ancient Inscriptions' (1774); 'Travels in Asia Minor' (1775); and 'Travels in Greece' (1776). Chandler was an Anglican clergyman and at his death was rector of Tilehurst, near Reading.

Chandler, Seth C., American astronomer: b. Boston, Mass., 16 Sept. 1845. He is well known for his investigations and observations of the phenomena of variable stars, the computation of comet orbits, and, in connection with Ritchie, for devising a system of astronomical code-telegrams for the announcement of astronomical discoveries. He also invented the Almucantar, and published a very complete treatise on the method of its use. He is an authority on the subject of variable stars, of which he has published a complete catalogue.

Chandler, William Eaton, American politician: b. Concord, N. H., 28 Dec. 1835. He was graduated at Harvard Law School in 1855, entered the New Hampshire legislature in 1862, became judge advocate general of the navy department in 1865, and secretary of the navy in 1882, serving three years. In 1887–1901 he was a United States senator from New Hampshire.

Chandler, Zachariah, American statesman: b. Bedford, N. H., 10 Dec. 1813; d. 1 Nov. 1879. He received a common school education, and early in life went to Detroit, and engaged in the dry goods business, in which his energy and ability soon brought success and put him in possession of a handsome fortune. He was mayor of Detroit in 1851, the defeated Whig candidate for governor of Michigan in 1852, an active organizer of the Republican party in 1854, and in January 1857 was elected to the United States Senate to succeed Gen. Lewis Cass. He was re-elected in 1863 and 1869; then served for a time as secretary of the interior in President Grant's cabinet, and was again elected to the Senate in February 1879. He opposed the admission of Kansas under the Lecompton constitution 1858, and he was the author of the famous "blood letter," in which he said "without a little blood-letting, this Union will not, in my estimation, be worth a rush." Though a warm friend of Lincoln, he was more radical than the latter, and often differed from him in matters of public policy. In July 1861 he introduced a sweeping confiscation bill which failed to pass; and in July 1862 violently assailed McClellan in a speech in the senate. He was a man of imposing presence, fine judgment, great energy, and perseverance. He was found dead in bed on the morning after delivering a political address in Chicago.

Chandler School of Science. See CHANDLER, ABIEL.

Chan'dos, the name of a noted English family, descended from a follower of William the Conqueror, the last representative in the direct male line being Sir John Chandos (d. 1428), whose sister married one Giles Brydges. Their descendant, Sir John Brydges, was lieutenant of the Tower under Queen Mary, and was created Baron Chandos in 1554. James Brydges (1673–1744), eighth Lord Chandos, sat in Parliament for Hereford from 1698 to 1714, and was created Duke of Chandos in 1719. The lucrative post of paymaster of the forces abroad supplied means for building a palace at Canons, near Edgeware, which cost $1,000,000, but was torn down at the Duke's death. Here Handel lived two years, wrote anthems for the chapel service, and produced 'Esther.' In 1796 the title passed by marriage to the family of Grenville, now retaining the title of Duke of Buckingham and Chandos.

Chandpur, chŭnd- or chänd'-poor, India, a town in the Bijnaur district of the Northwest Provinces, about 40 miles east-northeast of Meerut. It is thriving, well paved, and drained; there is a trade in sugar and grain, besides some manufactures of cotton cloth, pipes, etc. Pop. 13,000.

Chang-Chau, chäng'-chow', China, a city in the province of Fokien, 35 miles west-northwest of Amoy, which is its port. It stands in a valley surrounded by hills and intersected by a river. Its walls are about four and a half miles in circuit, and immediately within is a space planted with large trees. It is the centre of the silk manufacture of the province. Pop. about 900,000.

Chang-Sha, chäng'-shä', China, capital of the province of Hu-Nan, on the Siang River. It is not a treaty port, but has an important native trade carried on in small boats. A telegraph station is projected and in 1900 surveys were completed for a railway. Pop. about 350,000.

Chan'ga, a species of mole-cricket (*Scapteriscus didactylus*) injurious in Porto Rico. The changa is found throughout that island, living in galleries in the earth, and damaging the crown and roots of the tobacco, cane, and small crops; it is the most serious insect pest in the island. (See MOLE-CRICKET.) Consult Barrett, 'The Changa, or Mole-cricket'; 'Bulletin No. 2, Porto Rico Agricultural Experiment Station,' Washington, 1902.

Changarnier, shäṅ-gär-nē-ā, **Nicholas Anne Theodule,** French general: b. Autun 26 April 1793; d. Versailles 14 Feb. 1877. He was educated at Saint-Cyr, and went in 1830 to Algeria, where for 18 years he saw much active service. On the proclamation of the republic in 1848 he acted as provisional governor-general of Algeria, but returned to Paris to take command of the garrisons of Paris and of the national guard. He did much to check the outbreaks of the anarchist party during 1849. At the *coup d'état* in December 1851, after being imprisoned in Ham, he went into exile till the Franco-Prussian war, when he offered his services to Napoleon III. He was in Metz with Bazaine, and, on its capitulation, retired to Brussels. He returned to France in 1871, entered the assembly, and assisted M. Thiers in reorganizing the army.

Change of Colors. See CHATOYANCY.

Change of Function. During the metamorphosis of insects, *Crustacea,* and other animals, organs at first adapted for certain uses become, with change of conditions of life, media, and consequently of habits, adapted to quite different uses or functions. Thus in the young larva (Nauplius) of many of the lower *Crustacea,* the three pairs of head appendages are formed for swimming; the first two pairs afterward change into the two pairs of antennæ, the third pair becoming the jaws of the adult. In the tadpole, which lives on dead leaves or animal matter, the intestine is very long and coiled, but in after life, when the frog feeds on living insects, it is very much changed in form, being much shorter. There are many examples of change of function by suppression of the original or chief function, what was a minor use becoming the chief one. Other examples are the transformation of the jaws of biting insects into the needle-like elements, aiding in the formation of the beak of bugs (q.v.); the transformation of the hypopharynx of caddis-flies into the piercing organ of fleas and flies; the modification of the maxillæ of biting insects into the spiral tongue of the butterfly. The mouth-parts of bees and butterflies lost their primitive functions and adopted entirely new shapes and uses after flowers appeared. Among fishes the clearest example is the change of the swimming-bladder of the gar pike, where it also functions as a breathing organ, until in the lung-fishes, which have probably descended from some ganoid, it becomes a lung.

These changes of functions are due to change of the surroundings, and consequently of habits, finally bringing about change of function. Hertwig states that a muscle may from many causes become functionless, but finally becomes transformed into a ligamentous band. What are the gill-supports of fishes may, as the results in certain of their descendants of the adoption of a terrestrial mode of life, become in part degenerate, while another part persists by assuming a new function, forming the jaws, the hyoid bone, and the small bones of the ear, which are morphologically the same structures as the gill-arches. Consult: Dohm, 'Der ursprung der Wirbelthiere und das Princip des Functions nichsels'; Hertwig-Kingsley, 'Manual of Zoology.'

Change of Life. See MENOPAUSE.

Change'ling, a child left or taken in the place of another. It was at one time a common superstition that young children were liable to be stolen or changed by fairies before being baptized; and hence they were carefully watched till that ceremony was over. It was thought that the fairies were always anxious to change their own starveling elves for the more robust children of men. The children so left were called changelings, and were known by their greater backwardness in growth or learning; hence, stunted or idiotic children were regarded as changelings.

Chank-shell, the shell of a gastropod mollusk (*Turbinella rapa*). An extensive fishery of these shells, which live in water from 12 to 15 feet deep along the shores of Ceylon and India, has been established at Tuticorin. The shell is a sacred emblem of Vishnu, who is often represented as holding a "sinistral" one in his hand. They are used by the Hindu women as bangles and leg ornaments, or anklets. The chank appears as a symbol on the coins of some of the ancient Indian empires, and is still retained on the coinage of the Rajah of Franvacore.

Chanler, Amelie Rives. See TROUBETSKOY.

Chan'ler, William Astor, American explorer: b. Newport, R. I., 11 June 1867. He studied at Harvard, but left the university to make explorations in Africa. He was elected to the New York legislature in 1897, and to Congress in 1898 as a Democrat. He served in the war with Spain and was commended in Gen. Shafter's reports. He has written 'Through Jungle and Deserts' and 'Travels in Eastern Africa'; etc.

Chan'nel Islands, a group of islands in the English Channel belonging to Great Britain, off the west coast of the department La Manche, in France. They consist of Jersey, Guernsey, Alderney, and Sark, with some dependent islets; area, 75 square miles. They are picturesque and very fertile, and are celebrated for a peculiar breed of cattle, the chief strains of which are the Jerseys, Guernseys, and the Alderneys, which differ from each other in minor characteristics. The islands are almost totally exempt from taxation, and the people enjoy besides all the privileges of British subjects. There are two lieutenant-governors, one for Jersey, and the other for Guernsey, Alderney, and Sark. The government is in the hands of two corresponding bodies called the "states," some members of which are named by the Crown, while others are chosen by the people, and others sit *ex officio.* These islands have been fortified at an immense expense. Ecclesiastically they belong to the diocese of Winchester. The Channel Islands form the only remains of the Norman provinces once subject to the English crown. They now export large quantities of fruit, vegetables, and flowers to the English markets, including grapes, tomatoes, and potatoes, partly grown under glass. The fisheries also are important. French is generally spoken. Pop. (1901) 95,841.

Channeling-machine, a machine for cutting the channels in boot-soles, to allow the thread to bury itself in the leather and be protected from immediate wear. It consists of a knife, which makes an oblique cut in the sole to a gauged depth and regulated as to distance from the sole-edge by a guide.

In stone-working the term is applied to a machine having a series of jumpers or chisels which make a groove across the face of a block in the quarry, or detached. It has a gang of cutters operated by direct-acting steam cylinder. The cutters have direct motion from the piston. The valve is reversed at the blow of the cutters; or, in case of no blow being given, it is reversed before the cylinder bottom is touched by the piston. The cutter-bar is adjustable on the cylinder-bar to suit the depth of groove cut. The whole mechanism is mounted on vertically adjustable rollers, and the feed device is operated from the cross-head.

Channels, or **Chain-wales,** of a ship, pieces of wood or iron projecting edgewise like a ledge from the ship's outside, abreast of and extending somewhat behind the masts. They serve to extend the shrouds and to prevent them from touching the gunwale, or being injured by rubbing against it.

Chan'ning, Blanche Mary, American author: b. Liverpool, England, about 1863; d. Brookline, Mass., 9 Aug. 1902. Her father was Rev. William Henry Channing (q.v.), an American clergyman, for many years in charge of a Unitarian Church in Liverpool, and she was a grandniece of the famous Dr. William Ellery Channing (q.v.). In 1890 she came to the United States and devoted herself to literary work and poster and book-cover designing. She was the author of 'Zodiac Stories' (1899); 'Winifred West' (1901); 'The Balaster Boys' (1902).

Channing, Edward, American historian: b. Dorchester, Mass., 15 June 1856. He graduated at Harvard in 1878, and in 1883 was appointed instructor in history there, becoming successively assistant and full professor of history. He has written: 'The Narragansett Planters' and 'Town and County Government of the English Colonies in North America' (Johns Hopkins Studies, 1883–4); 'Columbus and His Companions,' in Winsor's 'Narrative and Critical History of the United States' (1888); 'The United States, 1765–1865'; in collaboration with A. B. Hart, 'Guide to the Study of American History' (1896); and with T. W. Higginson, 'English History for Americans.' In 1882 he translated B. Delbrück's 'Introduction to the Study of Language.' He is a son of William Ellery Channing (1818–1901) (q.v.).

Channing, Edward Tyrrel, American scholar: b. Newport, R. I., 12 Dec. 1790; d. Cambridge, Mass., 8 Feb. 1856. He was a brother of William Ellery Channing, 1780–1842 (q.v.). He studied law with his elder brother, Francis Dana Channing, in Boston, and was admitted to the bar. He gave his attention chiefly to literature, and carried forward a careful and critical study of the Greek and Roman classics, with that of the great writers of England. The 'North American Review,' the earliest permanent periodical in America, had its origin in a club of young men, who, in the winter of 1814–15, projected a bi-monthly magazine. Willard Phillips, afterward author of the celebrated works on the law of insurance and of patents, was to be its editor. The committee on politics was composed of George Cabot, James Lloyd, John Lowell, Josiah Quincy, and others. The chief managers were to be President Kirkland, Jared Sparks, George Ticknor, Mr. Channing, Richard H. Dana, and John Gallison. At this time, William Tudor, author of the 'Life of James Otis,' returned from Europe with a matured plan for a quarterly review; and as the field was not large enough for two such works, the plan of the magazine was merged in that of Mr. Tudor, and the first number of the 'North American Review' was issued in May 1815, as a bi-monthly, the quarterly publication not being adopted until the commencement of the eighth volume. Tudor edited it for two years, and in 1817 it passed under the control of a club. Jared Sparks was chief editor for one year, when the duty was undertaken by Channing, aided by his cousin, Richard H. Dana. In October 1819, Mr. Channing was succeeded in the editorship of the 'Review' by Edward Everett, having been appointed Boylston professor of rhetoric and oratory in Harvard University. This post he held for 32 years, resigning it in 1851. During all this time, the department of rhetoric and oratory, including the charge of all the English compositions of the students, and carrying great influence over their reading and taste, was filled by him with more than satisfaction to the public of reading and thinking men.

He established and maintained for the college a high reputation for purity and elegance of style in composition and elocution, and gave direction to the reading of an entire generation of leading men in all departments of intellectual labor. He was a constant contributor to the 'North American Review,' almost to the time of his death. In 1856 a volume of his lectures to the senior class at Harvard was published. He was highly esteemed for the charm of his conversation, which was choice and pure in style, with an occasional use of a restrained but effective humor. He was a man of pure and just character, thoughtful and scholarly habits, with few and warm friendships; tolerant and liberal views of his fellow beings; a Unitarian of the old school in his theology, and a philanthropic conservative in his politics.

Channing, Francis Allston, English writer: b. United States 21 March 1841. He is a son of William Henry Channing (q.v.) and a brother of Blanche Mary Channing (q.v.) and was educated at Exeter College, Oxford. He has been prominent in advocating agricultural and educational reforms and has published 'Instinct'; 'The Greek Orators as Historical Authorities'; 'The Second Ballot'; 'The Truth About Agricultural Depression.'

Channing, William Ellery, American Unitarian clergyman: b. Newport, R. I., 7 April 1780; d. Bennington, Vt., 2 Oct. 1842. Entering Harvard College at 14 he took his degree in 1798 and though at first inclining to the study of medicine, presently decided upon the profession of the ministry. After his graduation he spent two years in Virginia as a tutor, but in pursuance of his ascetic views regarding renunciation, and the necessity of subduing the animal nature, he endeavored to accustom himself to hardships during this period, even denying himself sufficiency of food and clothing. The result of this unwise course was to implant in him the tendency to disease that made him for the greater part of his career a semi-invalid. Returning from Virginia he took up the study of theology, making at the start a careful study of the evidences of Christianity, wishing, as he

said, to know what Christ taught and not what men made him teach. In 1801 he was made regent of Harvard, the duties of this office being light, and the salary sufficient for his support while continuing his studies. In 1802 he preached his first sermon at Medford, Mass., from the text "Silver and gold have I none; but such as I have, give I thee." In 1803 he was ordained pastor of the Federal Street Church in Boston and continued in that relation for the rest of his life. In the earlier years of his ministry the denominational spirit was not especially strong in him and with the ministers of the Trinitarian churches in Boston, he was on most friendly terms. His opinions were ripening during this period, however, and in 1819, at the ordination of Rev. Jared Sparks in Baltimore, he preached a sermon in which for the first time he gave free expression to the principles of Unitarian Christianity, upholding the exercise of reason in religious matters; declaring the Bible to be "a book written for men in the language of men, and its meaning to be sought in the same manner as that of other books." He also objected to the doctrine of the Trinity, affirming his belief that Christ was distinct from and inferior to God, and sent to men as a great moral teacher, not as a mediator between erring man and offended deity. This discourse gave rise to much controversy and fixed definitely the Unitarian position as distinguished from that of the Trinitarians. It made him, moreover, the recognized leader of American Unitarianism, and much as he disliked controversy he never hesitated from uttering what he believed to be true because of hostile criticism. His greatest dread was of becoming creed-bound and thus losing perception of new truths, and he even spoke of himself as "little of a Unitarian," and standing aloof "from all but those who strive and pray for clear light, for a purer and more effectual manifestation of Christian truth." After 1824 Rev. Ezra Stiles Gannett was associated with him in the ministry of the Federal Street parish, and from this epoch his time was largely given to philanthropic and literary work, the asceticism of his youth having long since been supplanted by a more wholesome understanding of life and its requirements and duties. He visited Europe in 1822 and became acquainted with Coleridge and Wordsworth. He was one of the first to acknowledge the greatness of the latter, and save Shakespeare, he read no poet oftener. Channing was a fearless defender of freedom, and upheld Garrison when that great abolitionist was the most generally detested person in Boston. In the pulpit his mission, as he saw it, was to free men's minds from servile conceptions of God, to disabuse religion of its benumbing terrors, and to show forth to men the real significance of their moral natures. His writings on theological, social, and philanthropic themes have received the widest circulation and been translated into French, Italian, German, Icelandic, Russian, and Hungarian. The most notable of them include: 'Evidences of Revealed Religion'; 'Essay on National Literature' (1823); 'Remarks on the Character and Writings of John Milton' (1826); 'Character and Writings of Fénelon' (1829); 'The Duty of the Free States' (1835); 'Self Culture' (1838). He had a life-long abhorrence of slavery, but in his 'Duty of the Free States' his feelings on the subject find fullest expression. His name, moreover, was associated with the most of the social reforms of his day and besides bearing a part in the great anti-slavery agitation, he warmly sympathized in the temperance movement, was an ardent lover of peace, and deeply interested in schemes for educational advance. He stood for intellectual and spiritual ideals and foresaw dangers both to nations and individuals, in the spread of materialism, in the contented adoption of inadequate aims, complacent satisfaction with perishable interests. In an age when comparatively few religious leaders dared to think outside of narrow prescribed limits, Channing stood forth as the intellectual champion of freedom. Much of his influence may have been due, no doubt, to the singular sweetness of his disposition, and his entire nobility of character, but more of it was due to the fact that he spoke with utter fearlessness and thus inspired other men to free themselves from the fetters of dogma or of intellectual timidity. Although two generations have passed since his death, his name is still both familiar and beloved, and his beneficent influence, far from lessening its hold upon men, has deepened and widened with the years. Channing's literary style, while not highly ornamental, was both clear and vigorous, and his sentences were usually short and direct, though it is said that his personal preferences in the writings of others were for long and involved sentences. On 1 June 1903, a bronze statue of Channing by Herbert Adams was unveiled in the public garden in Boston, Mass., its site being opposite the Arlington Street Church, the successor of the Federal Street Church, of which he was so long pastor. The statue and its monumental setting were the gift of John Foster to the city. See 'Lives' by W. H. Channing and C. T. Brooks; 'Correspondence of Channing and Lucy Aikin'; Peabody, 'Reminiscences.'

OSCAR FAY ADAMS,
Editorial Staff 'Encyclopedia Americana.'

Channing, William Ellery, American poet; nephew of William Ellery Channing, the elder: b. Boston, Mass., 10 June 1818; d. Concord, Mass., 23 Dec. 1901. After some years spent in newspaper work he retired to Concord, where he lived the life of a recluse. His writings include: 'Poems' (1843–7); 'The Woodman' (1849); 'Near Home' (1858); 'The Wanderer' (1872); 'Conversations in Rome' (1847); and 'Thoreau, the Poet-Naturalist' (1873); 'Eliot'; 'John Brown.'

Channing, William Henry, American clergyman: b. Boston 25 May 1810; d. London 23 Dec. 1884. His father, Francis Dana Channing, died when he was very young. He graduated at Harvard College in 1829, and entering the Unitarian ministry preached with much success in Meadville, Penn., New York, Cincinnati, Nashua, Boston, and Rochester. Settling in England, he succeeded James Martineau as pastor of the Hope Street Chapel in Liverpool 1852–62. He was for two years chaplain of the Senate at Washington, but from the close of the Civil War lived entirely in England. He published: 'Memoirs of Dr. William Ellery Channing' (1848); 'Life and Writings of James H. Perkins'; 'Memoirs of Madame Ossoli (Margaret Fuller),' in connection with R. W. Emerson and J. F. Clarke. His addresses and discourses were often extemporaneous and deliv-

ered in a style highly impassioned and imaginative. During a considerable part of his career he was an earnest advocate of social reform. See 'Life,' by Frothingham (1886).

Chanson de Roland, the culmination of a cycle of 'Chansoms de Geste' or 'Songs of Valor,' celebrating the heroic achievements of Charlemagne. They are inspired especially by the joy and pride of the triumph of Christian arms over the Mohammedan invasion, which, through the gate opened by the Moors of Spain, threatened to subdue all Europe. The French text of the 'Chanson' was first published in Paris by M. Francisque Michel in 1837, and afterward in 1850 by M. F. Genin. Tyrwhitt, in his edition of Chaucer, was the first to call the attention of English readers to the 'Chanson'; but English tradition has it that the song was sung by the Norman Taillefer just before the battle of Hastings. The best and oldest French MS., called the 'Digby,' is preserved in the Bodleian library at Oxford. The French poem contains 6,000 lines. A fragment of 1,049 lines, translated in Middle English from what is known as the Lansdowne MS., is published by the Early English Text Society.

Chansons de geste, shänsôn' de zhest', the romances of the Middle Ages sung or recited by wandering minstrels. Their number in French is very large; in English they are not so numerous and most of them are translations of a French original.

Chant, Laura Ormiston Dibbin, English lecturer and reformer: b. Chepstow, Monmouthshire, 1848. In 1876 she was married to Thomas Chant. She has taught in schools as well as nursed in hospitals and has lectured widely both in England and the United States on literary and scientific subjects, being a prominent advocate of woman's suffrage, temperance, etc. She has published: 'Verona and Other Poems'; 'Short Stories'; and several collections of original songs.

Chant, a short musical composition adapted to the singing of the psalms and canticles. Chants are single when adapted to a single verse, and double when adapted to two verses, the former consisting of two strains of three and four bars respectively, and the latter being of twice that length. More recently quadruple chants extending over four verses have been introduced. The complete chant consists of four parts, namely: (1) the intonation or initial phrase leading up to the reciting note; (2) the reciting note, which is the dominant of the mode employed; (3) the mediation, or main body of the chant; and (4) the termination or concluding phrase. In modern Anglican chants, however, there is no intonation. The origin of the plain song of the Church is unknown, but the first attempt to reduce the traditional music to some definite system was made by Saint Ambrose, bishop of Milan (d. 397). More important, however, by far is the Antiphonarium of Gregory the Great, which appeared in the latter half of the 6th century and soon established itself as the chief and in fact only authority on Church music. The Gregorian tones were introduced into England by Saint Augustine, and in the course of their history in that country they underwent many modifications in the various local «uses.» During the Civil War and the Commonwealth they went out of use, but were revived at the Restoration. Not long afterward, however, the Gregorian chants began to give place to the modern double chants, and it is only in quite recent years that attempts have been made to revive them.

Chant du Depart, shäṅ dü dā-pär (Fr. «Song of Departure»), a popular French military song of the period of the Revolution, written by the poet Marie Joseph Chenier, to the music of Méhul.

Chantabon, shän-tä-bŭn', or **Chantiban,** an important commercial port of Siam, on the east side of the Gulf of Siam, near the mouth of the Chantibun River. It is occupied by the French as security for fulfilment of the treaty of 1893. It is a place of considerable trade, and gives access to a rich mineral district. Pop. (estimated) 30,000.

Chantal, shäṅ-täl, **Jane Frances Frémiot** (frām-yō) **de,** SAINT, French devotee, foundress of the order of the Visitation B. V. M.: b. Dijon, France, 1572; d. Moulins 13 Dec. 1641. She was the daughter of a president of the Dijon parliament. On the death of her husband, Christophe Rabutin-Chantal, in 1600, she vowed not to marry again but to devote herself wholly to religious and charitable duties, under the direction of St. Francis de Sales, bishop of Geneva. The institute of the Visitation nuns was founded in 1610 at Annecy, and at her death it had 87 houses, and 60 years later 150 houses with 6,000 inmates — nuns and girls receiving a secular and religious education. She was canonized by Clement XIII. in 1767; her day in the Roman Calendar is 21 December. Her son, Celse Benigne de Rabutin-Chantal, was the father of the celebrated Madame de Sévigné. Her life and letters were published at Paris (1779).

Chanterelle, an edible mushroom (*Cantharellus cibarius*) of a bright orange color, with a pleasant fruity smell, growing in woods and on dry pastures. See MUSHROOM.

Chantibun. See CHANTABON.

Chantilly, shäṅ-tē-yē, France, a town in the department Oise, 25 miles north-northeast of Paris, on the Nonnette, celebrated for its splendid château, built for the Duc d'Aumale in 1876. It stands on the site of an older château which first became important under Anne de Montmorency. In 1632 it passed to the house of Condé, but the greater part was demolished at the Revolution. The last prince of Condé bequeathed the domain to the Duc d'Aumale in 1830. The present building and domain, including fine grounds and gardens, an extensive forest, etc., were presented by the Duke to the French Institute in 1886. The château contains a valuable library and a precious collection of works of art. The place was formerly celebrated for its manufacture of lace («Chantilly lace»). It is a great horse-racing and training centre. Pop. 4,500.

Chantilly, shăn-tĭl'lĭ, or **Ox Hill, Battle of.** On 31 Aug. 1862, the day after the second battle of Bull Run, Gen. Lee marched his army by way of Sudley Ford around Pope's right at Centreville, to seize Fairfax Court-House and interpose between Pope and Washington; and at night Jackson, who was in advance, bivouacked six miles west of Chantilly, on the Little River turnpike, Longstreet some distance in rear.

Next morning Gen. Stuart informed Jackson that a part at least of the Union army was at Fairfax Court-House, and that Pope's trains were passing on the road from Centreville to that place. Jackson moved cautiously toward Fairfax Court-House, and on reaching Ox Hill, three miles east of Chantilly, was informed by Stuart that the Union force seemed very strong on the road in front. Then Jackson formed line on Ox Hill ridge, his artillery massed on the left of the road, his infantry on the right, extending in the direction of the Centreville road. He had not completed his formation when he became aware of an approaching force from the Centreville road, upon which he strengthened his right and threw out skirmishers. About 1 P.M. Pope, who had heard of Jackson's advance toward his rear, sent Gen. I. I. Stevens with nine regiments, about 3,000 men, of Reno's corps to gain the road two miles east of Chantilly and hold Jackson in check until the army could be brought into position at Fairfax Court-House. Stevens moved from near Centreville across the fields, unexpectedly struck Jackson's advancing skirmish-line, thrown out from his right, and drove it back into a body of woods. Jackson then advanced a regiment from the woods, which was immediately driven back by Benjamin's battery. Stevens now formed a column of assault, six regiments in three lines, two regiments in a line. At 4.30 P.M. he placed himself in the centre of this column of 2,000 men, on open ground, and ordered it forward, Benjamin shelling the woods in front. Not a sight nor sound betrayed the presence of an enemy, until the advancing column, ascending a gentle slope, came to within 75 yards of the woods, when from a worm fence bordering them, came a terrific volley from Branch's brigade, smiting the column with great effect, men going down by the score. At first it began to waver, but quickly bracing up returned the fire, five color-bearers of the 79th New York, Stevens' old regiment, went down in succession. The assault was checked, Stevens ran forward, seized the colors and, calling upon his men to follow him, all rushed forward, routed Branch, and gained the fence, Stevens falling dead on it, with a bullet through his brain and the colors upon his head and shoulders. The column pushed on into the woods. At the moment of reaching the fence a sudden and terrific thunderstorm and fierce gale burst over the field, blowing the rain into the faces of the men on both sides, impeding their movements and wetting their ammunition. Jackson brought up fresh men, and after a contest of more than an hour the six regiments were driven out of the woods and fell back to the point where they had formed, and on the right of where Birney's brigade of Kearny's division had come up. Meanwhile three regiments of Reno's command had been sent in on Stevens' right, one only of which, the 21st Massachusetts, became seriously engaged and was repulsed with great loss. Gen. Kearny now came up with a battery, which he put in position and went to the right for a regiment to fill an interval on Birney's right. He met the 21st Massachusetts as it came out of the woods, and was leading it to the left when his attention was called to the fact that the Confederates were advancing from the woods and through a cornfield on Birney. He spurred his horse into the cornfield to reconnoiter, ran upon a skirmish-line, saw his mistake, and turned to ride back, when he was shot through the body and killed. A sharp encounter ensued between the 21st Massachusetts and the Confederates, which was ended by darkness; the regiment withdrew, the Confederates retired to the woods, and the battle was ended, neither side having permanently gained a foot of ground. The other two brigades of Kearny came up, and the ground was held until 3 o'clock in the morning of the 2d, when Kearny's and Reno's men fell back to Fairfax Court-House after the last of Pope's army from Centreville had passed. Pope fell back to Washington, and Lee marched to cross the Potomac into Maryland. The Union loss at Chantilly was about 800; that of the Confederates about 700. In the death of Kearny and Stevens the Union army lost two of its best officers. Consult: 'Official Records,' Vol. XII.; Hazard Stevens, 'Life of Gen. I. I. Stevens,' Vol. II.; G. H. Gordon, 'Army of Virginia.'

E. A. CARMAN.

Chantrey, chăn'trĭ, SIR **Francis Legatt,** English sculptor: b. Jordanthorpe, Derbyshire, 7 April 1781; d. 25 Nov. 1842. The chief amusement of his boyhood was in modeling figures in clay and drawing likenesses, and at his own request he was apprenticed in 1797 to a carver and gilder at Sheffield. Here he attracted the attention of J. Raphael Smith, a mezzotinto engraver and portrait-painter, who, perceiving his decided inclination for drawing and modeling, gave him instructions which tended greatly to prepare him for his future career. By 1804 he was resident in London, studying at the Royal Academy. Having acquired much reputation as a sculptor, he became the successful candidate for the marble bust which the inhabitants of Sheffield had resolved to erect to the memory of the Rev. J. Wilkinson. This interesting work, which may be said to have finally decided his future course, is in Sheffield Parish Church. Having settled permanently in London, he presented numerous busts at the exhibitions of the Royal Academy. About the same time he was a successful candidate for a statue of George III. for the city of London, and soon was almost universally regarded as the first monumental sculptor of the day. In 1815 he was chosen an associate and in 1818 a member of the Royal Academy. In 1819 he visited Italy, where he was elected member of the academies of Rome and Florence. He was knighted in 1835. His most celebrated works are the 'Sleeping Children,' a monument erected to two children of the Rev. W. Robinson, in Lichfield Cathedral; the statue of Lady Louisa Russell, daughter of the Duke of Bedford, in Woburn Abbey; Lady Frederica Stanhope with her infant child, in Chevering Church; Sir Joseph Banks, at the British Museum; Roscoe and Canning, at Liverpool Town Hall; James Watt, at Glasgow; the bronze statue of William Pitt, in Hanover Square, London; and statues of Horner, Sir J. Malcolm, etc., in Westminster Abbey, and a statue of Washington in the State House at Boston, Mass. His finest works are his busts, among the best of them being Sir Walter Scott, Watt, Wordsworth, and Porson. His full-length figures are said to betray an insufficient acquaintance with anatomy, and several of his equestrian statues in bronze are still more defective. The

postures are formal, and the horses, in their bodies and limbs, are very inanimate. He made munificent bequests for the advancement of art, the Royal Academy being endowed with a large fund for the purchase of works of sculpture and painting by artists residing in Great Britain.

Chan'try (old French, *Chanterie*), an ecclesiastical endowment to provide for the celebration of masses for the prosperity of the living or repose of the dead. Previous to the Reformation chantries were very numerous, almost every family of importance having founded one or more. Wealthy founders would endow a church or monastery, in which religious services should be celebrated continually. For less wealthy founders, an altar in the church of the locality was made to suffice. Sometimes small chapels, called chantry chapels, were appended to the main edifice, and occasionally, as at Wakefield and Bradford-on-Avon, such chapels were erected on bridges. The residences of priests engaged in the services were known as chantry houses, chantries, or colleges. The Chantry schools were widely spread over England prior to the Reformation. Chantries were dissolved in England by King Edward VI., and nearly all endowments were devoted to the purposes of the Crown.

Chanute, chạ-noot', Kan., a city in Neosho County, 125 miles southwest of Kansas City, Mo., on the Atchison, T. & S. F. and the Missouri, K. & T. R.R.'s. The city was incorporated in 1873. Manufactories here, including railroad shops, utilize the abundant natural gas of this locality, which is also used for lighting and various domestic purposes. The recent discovery of extensive oil-fields in the vicinity has led to a new and important industry, over 250 productive oil-wells having been opened. This industry promises rapid growth for the city, and also developments of great importance to the State. Pop. (1900) 4,208.

Chanzy, shäṅ-zē, **Antoine Eugène Alfred,** French general and politician: b. Nouart, Ardennes, 18 March 1823; d. Châlons-sur-Marne 4 Jan. 1883. After a course at the military school of Saint Cyr, he became sub-lieutenant of infantry in 1843, and was sent to Algeria. He subsequently served in Italy and Syria, but on becoming colonel he returned to Africa in 1868. On the outbreak of the war with Germany, in 1870, he was created a general of division, and after gaining the battles of Coulmiers and Patay, was put in command of the second army of the Loire. Here he fought heroically against the much stronger and more disciplined Germans, but finally had to retreat. He was elected to the National Assembly for the department of Ardennes, and during the Commune he narrowly escaped with his life. In 1873 he went to Algeria as governor-general, and in 1879 he stood for the presidency. In that year also he was sent to Russia as ambassador, a post which he held till 1881, when he became commander of the sixth army corps.

Chao-chow, chow'-chow', China, a city in the province of Kwang-tung, on the River Han, 195 miles northeast of Hong Kong. It is the centre of an important maritime division of the province. The channel leading to it is very shallow, so that ships of large burden can sail up only at high water. This city was included in the Treaty of Tientsin (1858) as a port open to foreign trade, but the foreign trade is transacted at Swatow. Pop. (1900, estimated) 200,000.

Chaos, according to the signification of the word, the void which embraces all things. Hesiod mentions, as the original principles of all things, Chaos, Earth, and Eros (Love); other ancient poets made Chaos alone the primeval source from which everything is derived; others added to it Night, Erebus, and Tartarus; and others still represented Chaos as the parent of the Earth and Heaven; after the production of which Eros (Love) completed the creation. Modern writers commonly understand by chaos the unformed primeval matter from which the universe was made.

Chap-books, a species of cheap literature, in the form of small pamphlets, which preceded the popular periodicals of the present day and were so called because prepared expressly for sale by the chapmen, or pedlars, who hawked them from district to district. They were largely productions of the provincial presses. The writers are mostly unknown, but one of the authors of Scottish chap-books was Dougal Graham (1724–79), bellman of Glasgow. Their matter was of the most varied character, and some of them were decidedly coarse and vulgar.

Chapala, chä-pä'la, Mexico, a lake on the high plateau of Jalisco, surrounded by steep, bare mountains. It has an estimated area of 1,300 square miles, contains many islands, and is traversed by the Rio Grande de Santiago.

Chapeaux, shä-pō (Fr. «hats»), a name applied to the partisans of France in Sweden in the 18th century, while those of Russia were called bonnets (caps). Having instigated war against Russia in 1741, and again in 1756, the calamities thus inflicted upon Sweden impaired the popularity of the *chapeaux*. Succeeding in 1769 in regaining their former position, the party was soon extinguished altogether by the advent of Gustavus III. and his reforms. The same names were also formerly applied in the French academy, the *chapeaux* constituting the party supported by the philosophers and the public, and the bonnets that upheld by the clergy and the court.

Chaparral-cock, chăp-a-răl'-kŏk, one of the English names of a species of ground-cuckoo (*Geococcys californianus*), so called from the chaparral, or somb, which it inhabits. A remarkable bird which Coues aptly describes as a «cuckoo compounded of a chicken and a magpie,» having a length of about two feet, of which a half is tail, very short wings, powerful legs, and feet of the cuckoo type, a rather long bill and crested head. The colors are changing and varied bronzes with brown and white markings. The chaparral-cock inhabits northern Mexico and southwestern United States, while a second related species is confined to Mexico. When pursued it seldom flies, but runs with great speed with upraised wings. Like other American cuckoos it builds a flimsy nest of twigs, in which six or more white eggs are laid at intervals. In feeding both animal and vegetable matter are partaken of. They are sometimes domesticated and trained to catch mice and other house pests. Other names applied to

this bird are road-runner, ground-cuckoo, paisand, and snake-killer, each of which suggests one of the peculiarities of the bird. See CUCKOO.

Chapel (French *chapelle*, Latin *capella*), a name for religious edifices of various kinds, especially for such as hold a subordinate position. In England and Scotland there are several kinds of chapels — parochial chapels, subordinate to, but distinct from, the mother church; chapels of ease, built for the accommodation of the inhabitants in large parishes; university chapels, and private chapels, whose names explain their uses. The term is also applied to small buildings attached to cathedrals, and separately dedicated. In England nonconformist places of worship are commonly called chapels in distinction from those of the Established faith to which the term church is applied. In the early history of the Massachusetts Bay Colony the Congregational body was the established church, and the first Episcopal church in Boston was consequently termed a chapel, retaining that name, "King's Chapel," to the present time. (See KING'S CHAPEL.) The word chapel is also applied to an association of union workmen in a printing-office for the purpose of promoting and enforcing order among themselves.

Chapelain, Jean, zhŏn shăp lăn, French poet, one of the earliest members of the French academy: b. Paris 4 Dec. 1595; d. there 22 Feb. 1674. Having gained a high literary reputation, more by ingratiating himself with Richelieu and other influential persons than by his intrinsic merits, he conceived the project of writing an epic, 'La pucelle,' which proved a total failure, although he spent over 20 years upon it. The first 12 cantos appeared in 1656; and to so high a pitch had public expectation been wrought, that, notwithstanding the adverse criticism of Boileau and Voiture, six editions came forth within the following 18 months. Eight new parts appeared in 1757, and the concluding four parts which never were printed, are in manuscript in the imperial library of Paris. Richelieu, to whom he dedicated a poem and whom he assisted in concocting literary works, conferred a pension on him; he presided over the organization of the French academy, took a conspicuous part in the early labors of that body, sat as academical critic upon Corneille's 'Cid,' and possessed during nearly 40 years a literary prestige, which was broken by his 'Pucelle,' although he remained in favor with the court.

Chapelle, shä-pĕl', **Placide Louis,** American Roman Catholic clergyman: b. Mende, France, 28 Aug. 1842. He came to the United States in 1859, and was graduated at St. Mary's College, and was ordained a priest in 1865. For five years he was a missionary, and from 1870 to 1891 held pastorates in Baltimore and Washington. He was made coadjutor archbishop of Santa Fé in 1891; archbishop in 1894; and archbishop of New Orleans in 1897. The following year he was appointed by the Pope Apostolic Delegate to Cuba, Porto Rico, and the Philippines. In the latter archipelago he warmly espoused the cause of the friars, resisting the demand of the factions which sought their expulsion.

Chaperon, shăp'ē-rōn, a cap or hood. Such a covering is worn by Knights of the Garter, and was at one time in general use, but was latterly appropriated to doctors and licentiates in colleges. A person who acts as a guide and protector to a lady at public places is called a chaperon, probably from this particular piece of dress having been used on such occasions. The name was also applied to devices which were placed on the heads of horses at pompous funerals.

Cha'pin, Edwin Hubbell, American clergyman: b. Union Village, N. Y., 29 Dec. 1814; d. New York 27 Dec. 1880. In 1837 he was ordained to the Universalist ministry, was a pastor at Richmond, Va., Charlestown and Boston, Mass., 1838–48, and then accepted a call to the Fourth Universalist Church in New York, a connection he retained until his death. His preaching attracted such throngs, especially of non-churchgoers, that within four years two changes were made to larger quarters. He was a pulpit orator of remarkable power and eloquence, and a popular lecturer whose services were always in demand. He laid small stress on creeds, but preached a high standard of earthly conduct, and his sermons dealt with every kind of social and political topic. His collected sermons and addresses are: 'Discourses on the Beatitudes' (1855); 'Select Sermons' (1860); 'Living Words' (1861); 'Lessons of Faith and Life' (1876); 'God's Requirements' (1881); 'The Church of the Living God, and Other Sermons' (1881). See 'Life,' by Ellis (1882).

Chapin, John R., American illustrator: b. Providence, R. I., 1823. He received a common school education and studied law, but took up art. He was a pioneer in periodical illustration in the United States. In 1853 he became art manager of the 'United States Magazine' and in 1861 for Harper Brothers. In 1863 he made the designs for the new series of bills for the national currency.

Chap'lain, a clergyman not having a parish or similar charge, but connected with a court, the household of a nobleman, an army, a prison, a ship, or the like. Chaplains in the United States army rank as captains of infantry; in the navy they have the rank of lieutenant, commander, and captain, according to length of their service.

Chaplain of the Fleet, The, a novel by Walter Besant and James Rice, published in 1881. It gives a detailed account of the famous Liberties or Rules of the old Fleet prison in London, and of the Fleet marriages of the 18th century. These "Rules" were houses in certain streets near the Fleet Market, where prisoners for debt were allowed to live, outside the prison, on payment of fees. Among these prisoners were clergymen, who performed clandestine marriages. A regular trade sprang up, touters were employed to bring clients, and every species of enormity was practised. Gregory Shovel was one of these clergy, and so plumed himself on his success in this iniquitous traffic that he took the name of "Chaplain of the Fleet." This novel is considered one of the best of those written under the firm-name of Besant & Rice.

Chapleau, shä-plō, SIR **Joseph Adolphe,** Canadian statesman: b. Saint Therese de Blainville, Quebec, 9 Nov. 1840; d. Montreal 13 June 1898. He studied law and distinguished himself at the bar. He was chosen leader of the Quebec Conservatives and formed a cabinet in 1879, re-

maining premier of Quebec till appointed secretary of state for the Dominion in 1883. He was lieutenant-governor of Quebec in 1893-8.

Chaplin, shăp-lăn, **Charles Joshua,** French portrait painter: b. Les Andelys 6 June 1825; d. Paris 30 Jan. 1891. He was of English parentage, but was naturalized as a French citizen. Under Napoleon III. he was engaged in decorating the Tuileries and the Elysée, and he also painted many ceilings and wall decorations in Parisian public and private buildings as well as various portraits, mainly those of women.

Chap'lin, Heman White, American lawyer and short-story writer: b. Rhode Island 1847. His 'Five Hundred Dollars and Other Stories of New England Life' ranks with the best works of its kind.

Chaplin, Jeremiah, American historical writer: b. Danvers, Mass., 1813; d. New Utrecht, N. Y., 5 March 1886. He was author of: 'Life of Charles Sumner'; 'Life of Franklin'; 'Riches of Bunyan'; 'Life of Galen'; and 'Life of Henry Dunster, First President of Harvard College' (1872), a work of much historical value.

Chap'man, Alvan Wentworth, American botanist: b. Southampton, Mass., 28 Sept. 1809; d. 6 April 1899. He graduated at Amherst 1830, studied medicine in Georgia and Florida, and in 1846 settled in Appalachicola, where he was collector of internal revenue 1865–6, and collector of customs 1866–9. He attained a high rank as a botanist, and the genus *Chapmannia* was named in his honor. He wrote: 'Flora of the Southern United States, Arranged According to the Natural System; the Ferns by D. C. Eaton' (1860, 2 ed. enlarged, 1883).

Chapman, Frank Michler, American naturalist: b. Englewood, N. J., 12 June 1864. Since 1887 he has been assistant curator in the department of vertebrate zoology in the American Museum of Natural History, New York. He is editor of 'Bird-Lore' and associate editor of 'The Auk.' Besides many papers in scientific journals, etc., he has published: 'Hand-book of Birds of Eastern North America' (1895); 'Bird-Life, a Guide to the Study of Our Common Birds' (1897); 'Bird Studies with a Camera' (1900).

Chapman, George, English poet, the earliest and perhaps the best translator of Homer; b. Hitchin Hill, Hertfordshire, 1557; d. London 12 May 1634. He was educated at Oxford, and in 1576 proceeded to London, where he made the friendship of Shakespeare, Spenser, Marlowe, and other distinguished writers of the time. As to his personal history little is known, but he is supposed to have held some post in connection with the court. The first of his works, so far as known, was the 'Shadow of Night,' a poem published in 1594. His translation of the 'Iliad,' in rhyming lines of 14 syllables each, was published in three separate portions, in 1598, 1600, and 1603. It has been highly commended by such poets as Pope, Keats, and Coleridge, as also by Lamb. Keats' sonnet 'On First Looking Into Chapman's Homer' ("Then felt I like some watcher of the skies," etc.) is well known. In 1614 appeared his translation of the 'Odyssey' in the same metre as the 'Iliad,' followed in the same year by that of the 'Battle of the Frogs and Mice' and the Homeric hymns. He also translated Hesiod's 'Works and Days' and portions of various classic poets. He wrote numerous plays, almost all now forgotten, though containing some fine passages. The earliest of these was 'The Blind Beggar of Alexandria,' a comedy, 1598. He was associated with Jonson and Marston in writing the comedy of 'Eastward Ho!' which from its satirical reflections on the Scotch is said to have nearly brought severe punishment on the authors. Among his tragedies are 'Bussy d'Ambois', 'Cæsar and Pompey', 'Revenge for Honor', and two dramas on the life of Marshal Biron, which Swinburne characterizes as "a storehouse of lofty thought and splendid verse, with scarcely a flash or sparkle of dramatic action." An edition of his works was published (1873–4). See Swinburne, 'George Chapman: a Critical Essay' (1875); Matthew Arnold, 'On Translating Homer.'

Chapman, Henry Cadwalader, American physician: b. Philadelphia 17 Aug. 1845. He graduated at the University of Pennsylvania in 1863, from the medical department in 1867, and after three years study in Europe settled in practice in Philadelphia. He has lectured on 'Anatomy and Physiology' in the University of Pennsylvania; on 'Physiology of the Nervous System' in Jefferson Medical College, and is curator of the Philadelphia Academy of Sciences. He has published: 'Evolution of Life' (1878); 'History of the Discovery of the Circulation of the Blood' (1884); 'Medical Jurisprudence and Toxicology' (3 ed. 1903).

Chapman, J. Wilbur, American clergyman: b. Richmond, Ind., 17 June 1859. He graduated at Lake Forest University, Illinois, in 1879, and at Lane Theological Seminary in 1882. After pastoral work in Albany and Philadelphia, and evangelistic work in all parts of the country, he became pastor of the Fourth Presbyterian Church in New York. He is a prolific writer of Sunday-school and Christian Endeavor literature, of which the following are among his most recent titles: 'The Lost Crown' (1898); 'Spiritual Life of the Sunday-school' (1899); 'The Surrendered Life' (1899); 'From Life to Life' (1900); 'Life and Work of D. L. Moody' (1900); 'Revivals and Missions' (1900); 'Day by Day' (1901); 'Man Who Said He Would' (1902).

Chapman, John Gadsby, American artist: b. Alexandria, Va., 1808; d. 28 Nov. 1889. Early indicating his taste for design, he was enabled by the liberality of a friend to visit Rome, and to study and practise his art there for several years. After his return to the United States, he removed to the city of New York, where, by his rare union of mechanical ingenuity with artistic taste, he rapidly obtained ample employment. He executed many original designs for the illustration of works of taste or fancy, and also painted the 'Baptism of Pocohontas' for one of the panels in the rotunda at Washington. In 1848 he returned to Rome.

Chapman, John Jay, American lawyer and essayist: b. New York 1862. He was graduated from Harvard in 1884, was admitted to the New York bar and has been in active practice there since. His essays and speeches have attracted considerable attention on account of their striking individuality and original point of view. His published volumes include: 'Emerson, and Other Essays' (1898); 'Causes and Consequences' (1898); 'Practical Agitation' (1900).

Chapman, Maria Weston, American reformer: b. Weymouth, Mass., 1806; d. there 1885. She was a daughter of Warren Weston, and received her education in her native place and also in England. She married in 1830; became an active opponent of slavery in 1834; and after the death of her husband in 1842, went to Paris, France, and assisted the anti-slavery cause with her pen. She returned to America in 1856. She edited the autobiography of her friend, Harriet Martineau (1877), and wrote: 'Songs of the Free' (1836); 'Right and Wrong in Boston; Report of the Boston Female Anti-Slavery Society' (1836); 'Right and Wrong in Massachusetts' (1840).

Chapone, shą-pōn', **Hester,** English story-writer and poet: b. Northamptonshire 27 Oct. 1727; d. 1801. She wrote: 'Ode to Peace'; 'Fidelia,' a story; 'Miscellanies in Prose and Verse'; and other works.

Chapoo, chä-poo', China, a seaport in the province of Chekiang, on the north side of a large bay, 35 miles north from Ningpo. It is fortified and garrisoned by Manchu troops, carries on a very considerable trade, and was once the only Chinese port which was permitted to trade with Japan.

Clappe, Claude, klōd shäp, French engineer and mechanician: b. Rouen 1760; d. Brulon 23 Jan. 1805. Having invented an ingenious system of signals to communicate at a distance with his friends, he presented it to the French legislative assembly in 1792. It was successfully tried between Paris and Lille, on a length of 48 leagues, and was adopted by the government. Chappe established several lines in France, and the one running north was first put in motion to announce the recapture of the town of Condé from the Prussians. The inventor was at once rewarded by the convention, which, by a decree, appointed him *ingénieur télégraphe.* The lines were extended all over France, and the system was also adopted, with some alterations, through Germany and England. The attacks to which he was subjected, by persons jealous of his invention, preyed so much upon his mind that he committed suicide.

Chappe d'Auteroche, dō-tē-rōsh, **Jean,** French astronomer: b. Mauriac, Auvergne, 2 March 1722; d. San Lucas, Cal., 1 Aug. 1769. He was a priest, but giving his whole attention to astronomy, became one of the assistants of Cassini in delineating the general map of France, and edited the astronomical tables of Halley. In 1760 he was designated by the academy to make an observation of the transit of Venus over the sun's disk, which Halley announced would happen 6 June 1761. He consequently set out for Tobolsk, in Siberia, which was pointed out as the most favorable point of observation. His mission was successfully accomplished; and returning to France at the end of two years, he published in 1768 his 'Voyage en Sibérie.' The following year he sailed for California to observe another transit of Venus, which was to take place June 3. He was equally successful on this occasion, but died soon afterward. The results of his last expedition were published by Cassini, under the title of 'Voyage de la Californie.'

Chap'pell, William, English author: b. 20 Nov. 1809; d. London 20 Aug. 1888. For the most of his life he lived in London, where he was for some years a member of a great music publishing house. His first work of importance was 'A Collection of National English Airs, Consisting of Ancient Song, Ballad, and Dance Tunes' (1838-40). He took a principal part in the foundation in 1840 of the Musical Antiquarian Society and the Percy Society, and published the first volume of a 'History of Music' in 1874.

Chapple, Joseph Mitchell, American journalist: b. La Porte City, Ia., 18 July 1867. He studied at Cornell College, Iowa, and was engaged in journalism in Dakota, Ashland, Wis., and Chicago until 1897, when he became editor and publisher of 'The Bostonian,' afterward changed to 'The National Magazine,' Boston, Mass. He has written two novels: 'The Minor Chord' (1895; new ed. 1898); and 'Boss Burt, Politician' (1896).

Chap'ra. See CHUPRA.

Chaptal, Jean Antoine Claude, zhŏn äṅ-twäṅ klōd shäp-täl, COUNT DE CHANTELOUP, French chemist and statesman: b. Nogaret, Lozère, 4 June 1756; d. Paris 30 July 1832. During his medical studies and practice he devoted much research to the science of chemistry, in which he soon became eminent, and was appointed professor at Montpellier, where he taught successfully the doctrines of Black, Lavoisier, and Cavendish. He established chemical works near Montpellier, being the first attempted of the kind, and by which he was soon enabled to produce various chemicals hitherto imported, such as the mineral acids, alum, soda, and salts of lead. The authorities of Languedoc heaped honors on him; the Spanish government offered him a pension of 56,000 francs to go to Spain, and according to his biographer, Washington wrote three times to Chaptal, inviting him to America. After the outbreak of the French revolution he published a political pamphlet, entitled 'Dialogue Between a Montagnard and a Girondist,' and was arrested, but through the intercession of friends was liberated. The Committee of Public Safety placed him in charge of the powder mills of Grenelle, which produced, under his management, 3,500 pounds of gunpowder daily. Once more returning to Montpellier, he was elected member of the institute, and devoted himself to science, till Bonaparte summoned him to the council of state, where he had the supervision of national education. When Lucien Bonaparte resigned the portfolio of the interior, Chaptal took his place as minister, and for four years performed the duties of the department with much administrative ability. He founded the conservatory, school of arts,

and society for encouragement of industry, introduced the modern French system of weights and measures, established a model farm and a system of distribution of agricultural seeds, reorganized the prisons and hospitals, extended the network of highways over the face of the country, and organized the carrying out of the plans of extension of the Louvre and rues de Rivoli and Castiglione, since completed by Napoleon III. On Napoleon's return from Elba, the count was appointed director-general of commerce and manufactures. Louis XVIII. struck him from the list of peers, but left him on the roll of the academy. His works are all on chemical subjects, and may yet be consulted with advantage, especially his 'Treatise on Chemistry Applied to the Arts.'

Chap'ter (Latin *caput*, head), one of the chief divisions of a book. As the rules and statutes of ecclesiastical establishments were arranged in chapters, so also the assembly of the members of a religious order, and of canons, was called a chapter, because some or all of the chapters containing the rules were read there; and the place where they assembled, as well as the reproof administered to a delinquent member, by reading the rules of the chapter transgressed, had the same name. The orders of knights, which originally had much of the ecclesiastical constitution, used this expression for the meetings of their members, and even some corporations of mechanics or tradesmen call their assemblies chapters. In England, as elsewhere, the deans and chapters had the right to choose the bishop, but Henry VIII. assumed this right as a prerogative of the crown.

Chap'ter-house, a building attached to a cathedral, collegiate church, or church belonging to a religious house in which the chapter meets for the transaction of business. Chapter-houses are of different forms, being sometimes regular polygons of four, eight or ten sides, and in other cases circles or parallelograms; and their architecture is often noteworthy. Sometimes they were the burying-places of clerical dignitaries. Among the most notable of English chapter-houses are those at Lincoln cathedral (which is decagonal, with a central column), Salisbury, Wells, Southwell, and York, the two last named excelling all others in Great Britain in the beauty and richness of their carven stonework. There is a chapter-house at Bristol, of the Norman period, in shape a parallelogram, much enriched with arcading and various kinds of Norman ornament. The chapter-houses at Gloucester and Canterbury are likewise parallelograms, but of the Third Pointed or Perpendicular period.

Chapuis, shä-pwē, **Auguste Paul Jean Baptiste,** French musician: b. Dampiene-sur-Saône 20 April 1862. Since 1895 he has been inspector-general of musical instruction in the Paris schools. He has composed 'Tancred', a lyric drama, and much successful church music.

Chapultepec, chä-pool-tĕ-pĕk' ("Grasshopper Hill"), **Battle of.** This, the last considerable engagement of the Mexican war, and which was followed by the immediate occupation of the City of Mexico, was fought 12–13 Sept. 1847. Chapultepec is an isolated rocky mound 150 feet high, two miles southwest of the southwestern or Belen gate of the city, and guarding a main road into it; sharply precipitous on the northern, eastern, and part of the southern sides, but on the west and southwest sloping gradually to level marshy ground partly covered with a cypress grove. Here Montezuma and his predecessors had their pleasure grounds, and Chapultepec was their country-seat. A fortified castle was started here by the viceroy Galvez in 1785, but left unfinished; from 1822 it was used as a military academy, in 1847 having some 40 students, who fought heroically in the battle. It was guarded by strong batteries, and its approaches were protected by walls (an aqueduct on the north) which shielded other batteries; through the marshy fields in front of these were irrigating ditches, some large and deep, with high banks and sticky bottoms, very serious obstacles to troops and artillery. The one military defect of the castle for modern warfare was the limited force that could effectively use arms within it; the garrison of 800, commanded by Gen. D. Nicholas Bravo, was as large as could well operate there. Along its approaches were some 4,000 to 4,500 more troops, while Scott had 7,500; but Santa Anna dared not strip the other entrances to the city. By the battle of Molinos del Rey (q.v.) on the 8th Scott had carried a set of long stone buildings southwest of Chapultepec and, though under its guns, forming some protection for hostile artillery. On the 12th Captain Huger planted heavy batteries here and at three other places, to range the south and west of the hill, the only accessible portions, on which an assault had been determined; and their fire gradually silenced that from Chapultepec, breached the defenses, and caused much loss. About 8 A.M. on the 13th Scott launched two assaulting columns: Pillow on the west, from Molinos del Rey through the cypress grove, supported by Worth; Quitman against the south, from the heights of Tacubaya, where Scott had his headquarters, supported by Persifer F. Smith's brigade. Preceded by the pioneer companies with ladders, axes, picks, and crowbars, and under a plunging fire, they surmounted all obstacles, cleared the approaches, broke through the walls, climbed the heights, entered the castle gates, and having cut off retreat by the northwestern road to Mexico, captured the entire garrison. The approaches and castle had been mined, but the defenders waited too long before exploding the mines, and failed. The next day the American army overcame all remaining resistance and entered the capital. Their loss in these three days was 863 killed and wounded, including Col. T. B. Ransom killed, Pillow and Shields wounded. The Mexican loss was unknown, but certainly as heavy, and included several gallant and brilliant officers; and 823 prisoners were taken, including three generals, one the commandant of the academy. Among the American officers prominently engaged were a remarkable number afterward distinguished in military and civil life: Robert E. Lee, Joseph E. Johnston, James Longstreet, "Stonewall" Jackson, David E. Twiggs, Gideon J. Pillow, D. H. Hill, J. B.

Magruder, Barnard E. Bee, P. G. T. Beauregard, Geo. E. Pickett, Raphael Semmes; George B. McClellan, Silas Casey, E. V. Sumner, Jesse L. Reno, James Shields, I. I. Stevens, Z. B. Tower, William S. Harney; Thomas H. Seymour, John W. Geary, Mayne Reid. Franklin Pierce had been severely wounded at Molinos del Rey. See C. M. Wilcox, 'History of the Mexican War' (1892).

Char, här, **Friedrich Ernst (Fritz),** German composer: b. Cleve-on-Rhein 3 May 1865. He is a noted opera conductor, and wrote the celebrated romantic opera, 'The Rogue of Bergen' (Der Schelm von Bergen), besides sonatas and cantatas.

Char, chär, a genus of fishes (*Salvelinus*) of the family *Salmonidæ*. They were formerly classified in the same genus as the trout (Salmo), from which they are, however, differentiated by color and by the shape of the vomer. There are several varieties of this fish, all having intense and beautiful colors; length from 10 to 15 inches; weight sometimes as high as two pounds, but generally ranging under one pound. All kinds are held in esteem for the table. They are found plentifully in the deeper lakes of England, Wales, Ireland, and more rarely in Scotland, also in the Lake of Constance and Lake Geneva. The best known American variety is the brook-trout, *S. fontinalis;* there is also a variety found in Maine, known as the Rangeley Lake trout, which is very similar to the European char.

Chara, kā'ra, in botany, a genus of plants, the typical one of the order *Characeæ* (q.v.). The species are found in ponds. In palæontology, the nucules, known under the name of *Gyrogonites,* are found for the first time in the fresh-water beds of the Jurassic (Oölitic) formations. They are the minute spiral seed-vessels or sporangia of these plants.

Characeæ, kā-rā'se-ē, an order of cryptogamous plants, division *Algæ,* composed of an axis consisting of parallel tubes, from which the branches are given off in whorls. The axes are either transparent or incrusted with carbonate of lime. The plants inhabit stagnant water, both fresh and salt, beneath which they are always submersed. They are found in almost every part of the world, but are most common in the temperate zone. The fetid odor which many species emit renders the surrounding locality very unhealthy.

Charade, sha-rād', a syllabic enigma, that is, an enigma the subject of which is a name or a word that is proposed for discovery from an enigmatical description of its several syllables, taken separately, as so many individual words. A charade may be called complete if the different enigmas which it contains are brought into a proper relation to each other, and, as a whole, unite in an epigrammatic point. The French excel in this species of literary amusement.

Acting Charades, a kind of entertainment made up of pantomime and dialogue, and improvised by the members of an evening party. The syllables and complete word are meant to be suggested by the various divisions of the piece.

Charadriidæ, kă-ra-drī'ī-dē, the plovers, a family of birds of the order *Limicolæ,* which along with several equivalent groups is sometimes considered as constituting a more extended order, *Charadriiformes.* Even as limited by American ornithologists the family is a large and important one, embracing many genera and species from all parts of the world. They have long, slender legs, with the toes united by a small membrane, the hinder one very small and elevated, or wanting; the tarsus reticulate; the neck short and thick; body stout; plumage compact, with 12 short tail-feathers and very long primary wing-quills; the beak is short and shaped much like a pigeon's. By European ornithologists the limits of the family are extended to include various related groups, especially the snipes (*Scolopacidæ*), which then constitute sub-families. See Killdeer; Lapwing; Plover; etc.

Charadrius, ka-răd'rī-ŭs, the genus to which the plover belongs, forming the type of the family *Charadriidæ,* which includes also the lapwings, dotterels, oyster-catchers, turnstones, sanderlings, etc. (qq.v.).

Charcoal, an impure variety of carbon, prepared from vegetable substances or bones. Wood charcoal consists of wood burned with but little access of air. Billets of wood are built into a heap, which is covered with earth or sand. The heap is fired at openings left near the bottom of the pile, and the gases escape at small openings above. For making fine charcoal, such as that of willow, used in the manufacture of gunpowder, the wood is burned in iron cylinders, or rather retorts, in which a process of destructive distillation removes the volatile hydrocarbons, pyroligneous acid, etc. By this more perfect means the process is accurately regulated. Charcoal is used in the arts as a fuel; as a polishing powder; a table on which pieces of metal are secured in position to be soldered by the blowpipe; a filter; a defecator and decolorizer of solutions and water; an absorbent of gases and aqueous vapors; a non-conducting packing in ice-houses, safes, and refrigerators; an ingredient in gunpowder and fireworks; and in the galvanic battery and the electric light.

Animal charcoal, used largely in sugar-refining and as a disinfectant and filtering medium, is prepared by calcining bones in closed vessels. These are either retorts, similar to those in which coal is distilled for the production of illuminating-gas, or they are earthenware pots, piled up in kilns and fired. Charges of 50 pounds of bones to a pot will require 16 hours of firing. The bones are then ground between fluted rollers, the dust removed, and the granulated material used for charging the filters of the sugar-refiner. The material is used for removing color, feculences, and fermenting ingredients from the syrup.

In medicine charcoal is sparingly used, but is of service in gastric indigestion in which there is much evolution of gas. Charcoal takes up the gas and therefore prevents distention and pain. It has no curative qualities and is solely alleviative.

Charcot, Jean Martin, zhŏn mär tăn shär-kō, French physician: b. Paris 29 Nov. 1825; d. 16 Aug. 1893. His specialty was in the treat-

ment of nervous and mental diseases, and he performed many curious and successful experiments in hypnotism and mental suggestion, in the Salpetriere, where he founded a clinic for the treatment of nervous diseases in 1880. He published several works treating of these subjects.

Chard, the leaves of artichoke (*Cynara scolymus*) covered with straw in order to blanch them and make them less bitter. Beet chards are the leaf-stalks and midribs of a variety of white beet (*Beta cicla*), in which these parts are greatly developed, dressed for the table.

Chardin, shär-dăn̈, Sir **John,** French Oriental traveler: b. Paris 26 Nov. 1643; d. London 26 Jan. 1713. Before he had reached his 22d year his father, a jeweler, sent him to the East Indies in order to buy diamonds. Chardin lived six years in Ispahan, where he was less engaged in mercantile business than in profound studies and scientific researches, making use of his connections at court for collecting the most authentic information of the political and military state of Persia. He collected the most valuable materials relating to antiquities and history. In 1670 he returned to France, but again left France for Persia, in 1671, taking with him a considerable quantity of precious stones artistically set, exquisitely worked jewelry, etc. He spent 10 years partly in Persia and partly in India. In 1681 he arrived in London, when he received the honor of knighthood. He published the first volume of his 'Travels into Persia and the East Indies,' in London, in 1686. The other volumes were about to follow, when he was appointed minister plenipotentiary of the king of England to the States-General of Holland, and agent of the English East India Company to the same. In 1711 two editions of his 'Travels' appeared. He soon after returned to England. The exactness and truth of his statements, and the extent of his knowledge, have been confirmed by all succeeding travelers, and have been serviceable to Gibbon, Helvetius, and Montesquieu. The best edition of Chardin's 'Travels' is that by Langlès, 1811, in 10 volumes.

Charente, shä-rŏn̈t, France, an inland department, formed chiefly out of the ancient province of Angoumois, and deriving its name from the river Charente, by which it is traversed; area, 1,487,447 acres; capital, Angoulême. It is in general uneven, with hills covered with chestnut-trees, sandy plains, meadows, etc. The principal rivers are the Charente, joined by the canal of Poitou with the Vienne, the Dronne, Tardoire, Bandiat, Touvre, and Né. The wines of the department are of inferior quality, and in little request for the table; but they yield the best brandy in Europe. The celebrated cognac brandy is made in the districts of Champagne, Cognac, Jarnac, Rouillac, and Aigre from a grape called the *folle blanche*, which yields a white wine. The red wines furnish an inferior brandy, without the bouquet that distinguishes the genuine cognac. The wine-growers themselves carry on the distillation, each estate being furnished with stills and the necessary apparatus. Excepting brandy and paper, the manufactures of the department are inconsiderable, consisting of sacking, cloth, cordage, hats, corks, and earthenware. The paper made at Angoulême is said to be the best in France. The department is divided into the five arrondissements of Angoulême, Barbezieux, Cognac, Confolens, and Ruffec. Pop. (1896) 356,236.

Charente, a river in France, rising in the department of the Upper Vienne; flowing west, and emptying into the Bay of Biscay, about 10 miles below Rochefort, opposite the Isle of Oleron; length about 200 miles. It gives its name to two departments, Charente (q.v.) and Charente-inférieure (q.v.).

Charente-inférieure, ăn̈-fā-rē-ėr, France, a maritime department on the west coast, bounded on the north by the department of the Vendée, and on the south by Gironde; area, 2,635 square miles. It comprises parts of the former provinces of Angoumois and Poitou. The principal rivers that traverse or bound the department are the Charente, Gironde, Seudre, Boutonne, and Sèvre Niortaise — all of which are navigable, as well as the canal of Brouage, and that between Niort and Rochelle. The soil is fertile, and well cultivated; and a considerable portion planted with vines. The pastures are good and well stocked with cattle, horses, and sheep. Along the coast are extensive salt marshes. Salt and brandy are the only articles manufactured to any great extent; the oyster and sardine fisheries are also of importance. Capital, La Rochelle. Pop. 453,000.

Charenton-le-Pont, shä-rŏn̈-tŏn̈-lė-pŏn̈, France, a town situated about a mile to the southeast of Paris, with which it is connected by rail and tramway, at the confluence of the Marne with the Seine. It has numerous mercantile and manufacturing establishments. The stone 10-arched bridge across the Marne used to be considered as the key to Paris on this side; hence the memorable attacks upon it both in the civil wars of France and in those with foreign enemies. At Petit-Charenton is the celebrated asylum for the insane of both sexes. From its connection with the asylum the town has given several significant popular phrases to the French language, equivalent to the use of Bedlam in English. A person of marked eccentricity is called a "Charenton boarder." Pop. 16,811.

Chares, kā'rēz, the name of two well-known Greeks. The Athenian Chares was the general through whose incapacity the Thracian colony was lost to Athens during the Social war in 358–356 B.C., and who exposed his country to the designs of Persia, by entering for mercenary purposes the service of the revolted satrap, Artabazus. Although recalled in disgrace, Chares was sent in 349 to the aid of Olynthus, and again he returned without having achieved anything. In 340 he commanded the army sent to Byzantium against Philip, again gave evidence of his incompetency, was replaced by Phocion, but once more invested with the supreme command. In 338 the fatal issue of the battle of Chæronea seems to have been mainly due to his ignorance. He was noted for his athletic figure, his profligacy, and his unscrupulous recklessness. Chares, the sculptor, a native of Lindus, Rhodes, flourished toward the close of the 3d century B.C. He was a pupil of Lysippus and the sculptor of the Colossus of Rhodes, one of the "seven wonders of the world," a representation of the Rhodian sun god erected in commemoration of the successful defense of

Rhodes against Demetrius Poliorcetes in 303 B.C. See COLOSSUS.

Charge, in heraldry, one of the bearings. This may be one of the ordinaries, as they are called, the straight line bearings, as fess or chevron or a much more elaborate figure, as the representation of an animal or the head of one. Sometimes the charge is imposed upon another charge.

In gunnery, charge signifies the quantity of powder used at one discharge of a gun.

In military tactics, charge is the rapid advance of infantry or cavalry against an enemy, with the object of breaking his lines by the momentum of the attack. Infantry generally advances to about 100 yards and fires, then gradually quickens the pace into the charge-step, and dashes at the enemy's lines. Cavalry charges in echelon or column against infantry, which is usually formed in squares to receive the charge.

Chargé d'Affaires, shär-zhā däf-fār, a representative of a country at a less important foreign court, inferior to an ambassador, or a minister, to whom is intrusted all matters of diplomacy. The title is also given to the officer to whom the charge of an embassy is entrusted during the temporary absence of the ambassador or minister plenipotentiary.

Charge of the Light Brigade, The, a remarkable military movement at Balaclava, 13 Oct. 1854, made by 600 English soldiers. The Russians were advancing in great strength to cut off the Turkish force from the English. Lord Raglan sent an order to Lord Lucan to advance, and Lord Lucan, not understanding what was intended, applied to Captain Nolan, who brought the message, and Nolan replied: «There, my lord, is your enemy.» Lucan then gave orders to Lord Cardigan to attack, and the 600 men rode forward into the jaws of death. In 20 minutes 12 officers were killed and 11 wounded; 147 men were killed and 110 wounded, and 325 horses were slain. The blunder must be shared by Lord Lucan, Gen. Airey, and Capt. Nolan. However, never victory was more glorious to the devoted men, than this useless charge. «It was magnificent, but it was not war.» When Lord Cardigan rallied the scattered remnants, and said: «My men, some one has blundered,» they replied: «Never mind, my lord, we are ready to charge again, if it is your lordship's command.»

Charikar', Afghanistan, a town in the district of Kohistan, 36 miles north of Kabul. It has a trade in the coarse cotton cloths manufactured throughout the district, and in iron, and also a considerable transit trade to Turkestan and central Asia. Charikar is the place of residence of the governor of Kohistan; and duties are levied here on merchandise passing between it and Turkestan. Pop. 5,000

Charing (chār'ing) **Cross,** a triangular piece of roadway at Trafalgar Square, forming the titular centre of London, so named from a cross which stood until 1647 at the village of Charing in memory of Eleanor, wife of Edward I. When the queen's remains were brought in 1290 from Grantham to Westminster Abbey, the king accompanied the bier and erected at each stage where it rested a memorial cross. Of the 13 crosses raised, but two beside that in London remain. The modern cross, erected in 1863, stands on about the same place as the older one, of which it is as nearly as possible a reproduction, its style being the decorated Gothic of Edward's time.

Chariot, a vehicle used in ancient times either for pleasure or in war. According to the Greeks, it was invented by Minerva; while Virgil ascribes the honor to Erichthonius, a mythical king of Athens, who is said to have appeared at the Panathenaic festival, founded by him, in a car drawn by four horses. The ancient chariot had only two wheels, which revolved upon the axle, as in modern carriages. The pole was fixed at its lower extremity to the axle, and at the other end was attached to the yoke, either by a pin or by ropes. The Greeks and Romans seem never to have used more than one pole, but the Lydians had carriages with two or three. In general the chariot was drawn by two horses. Such was the Roman *biga,* but we also read of a *triga,* or three-horse chariot, and a *quadriga,* or four-horse one. In ancient warfare chariots were of great importance; thus we read of the 900 iron chariots of Sisera, as giving him a great advantage against the Israelites. The Philistines in their war against Saul had 30,000 chariots. The sculptures of ancient Egypt show that chariots formed the strength of the Egyptian army. We have also numbers of sculptures which give a clear idea of the Assyrian chariots. These resembled the Egyptian in all essential features. In modern times the name chariot has been given to a kind of light traveling carriage now out of vogue.

Charitable Irish Society, Boston, Mass.; the oldest existing Irish organization in the United States. It was founded 17 March 1737, by a number of Irish Protestants, and has borne on its roll many distinguished people. Among its founders was the father of Gen. Henry Knox, of the Revolution. Gen. Knox, himself, was also a member of the society. It celebrated its centennial anniversary in 1837 with great eclat, among the guests on that occasion being Gov. Edward Everett, of Massachusetts; Mayor Samuel A. Eliot, of Boston; Hon. John P. Bigelow, secretary of state; Hon. Josiah Quincy, Robert Rantoul, Jr., and other prominent men. Andrew Jackson, president of the United States, during his visit to Boston, in 1833, received the society at the Tremont House, that city, and replied to an address from the organization. The society is in a flourishing condition, and is non-sectarian and non-political.

Charitable Trusts. A charitable trust is «a gift, to be applied consistently with existing laws, for the benefit of an indefinite number of persons, either by bringing their minds or their hearts under the influence of education or religion, by relieving their bodies from disease, suffering, or constraint, by assisting them to establish themselves in life, or by erecting and maintaining public buildings or works, or otherwise lessening the burdens of government; a gift to a general public use, which extends to the poor as well as the rich.» The things necessary to raise a valid trust are sufficient words to create it, a definite subject, and an object. In charitable trusts the object is generally uncertain, because if described with definiteness it would cease to be a charity and would be governed by

the ordinary rules of trusts. At one time it was held that charitable trusts were created by an act passed during the reign of Queen Elizabeth, and known as the statute of charitable uses, but it has been shown that these trusts existed long before that act was passed. Charitable trusts are recognized in all of the States of the Union, while a number of the States have never adopted the statute at all. Even where the statute is enforced, trusts while not within the letter, if within the spirit of the statute, are held to be good. Uncertainty of the object is one of the characteristics of a charitable trust, and it has led to what is known as the *cy près* doctrine, which is that the courts will interpret instruments creating charitable trusts so that if the exact object of the donor cannot be carried out the donation will be applied to something of a nature similar to that specified by the donor.

When a testator leaves property to his executors in such a manner that they are to be the sole judges of its use, and the executors die before the testator, it is doubtful whether the trust will come into existence, as the executors were the only persons who could designate for what the donation was to be applied. In some jurisdictions the rule is that if the property can be applied to other than charitable purposes it is too indefinite.

In cases in which the particular charitable purpose does not exhaust the whole fund, if from the instrument creating the fund, the intention appears that the entire amount is for charity, the surplus will be devoted to some other charity and will not form a resulting trust for the heir or next of kin. A gift may be made to a charity not in existence, and a gift to a specific charity will not fail for want of a trustee.

After the trust has come into existence, if the purpose for which the trust was created fails for any reason, it will be applied to some other purpose of a similar character, so as to fulfil as nearly as possible the purpose for which it was intended.

Charitable trusts are not subject to the rule against perpetuities, which is that property cannot be tied up for more than a life or lives in being and 21 years thereafter. If property left to a charitable trust is limited upon another estate not a charitable trust, and the first estate is in violation of the rule against perpetuities, the trust will not be sustained; but after the trust once comes into existence the rule against perpetuities is not applied to it. In the State of New York charitable trusts are governed by the same rules as any other trust.

By English law all bequests for charitable purposes, to be valid, must be strictly for the public benefit; that is to say, in favor of institutions for the advancement of learning, science, and art; for the support of the poor; or for other objects connected with the welfare of the public; and such bequests include those in favor of the Church or of other religious bodies sanctioned by the law. Bequests for superstitious uses are null and void. A body of commissioners (the charity commissioners), under whose superintendence such benevolent trusts are placed, was established under the Charitable Trusts Act of 1853. They have the power of inquiring into the administration of all English public charities. See MORTMAIN.

Charites, kă'rīt ēz, the Greek name of the Graces (q.v.).

Charities, Public. Following in the footsteps of civilization there has come a development of charity, often slowly and haltingly, but ever persistently, until to-day the treatment of its dependent poor is accepted as evidence of the civilization of a community. A glance through history discloses not merely neglect of the defective mentally and physically, by savage and barbarous peoples, but an aggressively cruel policy to rid the community of the burden of their care. Crippled children were left to die and helpless old persons were put out of the way. In contrast to that condition we find in the dawn of the 20th century a settled conviction in all civilized communities that it is as much the duty of the State to care for its dependents as it is to conserve the educational interests of its children. But this change was wrought only by self-sacrificing devotion of charitably inclined students of sociology through centuries of unremitting labor. So slow, indeed, was the development of the practice of charity that it is well within the last hundred years that the care of the helpless was left to individuals or was treated by society at large as an unreasonable burden on the State. Even after the conviction became permanent that for its own protection, if for no higher reason, the State should assume the responsibility of caring for its helpless classes the conception of its duties were so vague and the method to be followed was so undefined, that the results were eminently unsatisfactory. Society regarded its dependents as being much on the same plane as its criminals and treated them much in the same way. Prisoners, dependent children, sick poor persons, the insane, the epileptics and the helpless aged were huddled together under one department of government and it was not infrequently the case that little or no discrimination was made in their care. General demoralization ensued and it became apparent that a remedy must be found if further progress was to be made in the development of the practice of charity. This remedy was found in segregation. It was clear that not only physical separation but governmental separation of the various classes was necessary. Custom and tradition were hard obstacles to overcome, but the adherents of segregation were not to be denied, and after a long and bitter and often disheartening struggle they won their first victory, in the segregation of criminals. A separate and independent department of government was established for their care, although society retained in a large degree its old habit of regarding its criminals and its dependents in much the same light. But an opening had been made for segregation and its adherents were quick to press their advantage. They next demanded and obtained the segregation of the insane and followed this up by the successful demand for the segregation of epileptics, idiots, dependent children, the sick poor, homeless men and women, and the helpless aged. The aim was not merely to assure to each of these classes distinct physical separation from the others, but to give to each a government of its own so that it could receive the undivided attention and care

of persons competent to do the work entrusted to them and held directly responsible for that work. So beneficial did the experiment of segregation prove to be that the practice of charity made strides for good after it was adopted far out of all proportion to progress in previous years. Indeed the benefits from segregation are so marked and so convincing that the policy has been extended to different conditions in the same class. This is particularly noticeable in the modern treatment of consumptives, for whom special hospitals are being constructed and special diet prepared. And yet the subject has not been exhausted. It is susceptible of further development and closer application. There is a crying need for it in the care of helpless old persons, in the treatment of whom the causes of destitution and the moral character of the individual should always be considered. The demonstrated advantages of segregation may be summed up in the more intelligent attention that each class receives and in the promise that eventually the choice of persons entrusted with the care of dependents will be made with no other purpose in view than fitness for the position to be occupied. The greatest obstacle to the fulfilment of this promise is politics, but the time will come when the practice of charity will be above all politics, as by right and justice and humanity it should be. But in spite of segregation and in spite of all the other remarkable advances made in charitable work in the last half century, society, in a large part at least, persists in regarding the criminal and the pauper from the same view-points. Manifestly this is unfair and unjust. Poverty is not a crime, and the victims of poverty should not be classed with criminals, even in the public mind. The State has not always recognized this principle. On the contrary, its theory and its practice have been to force the poverty-stricken individual into association with the criminal. It is scarcely more than a quarter of a century ago that convicted criminals wearing the uniform of the penitentiary were employed as nurses in public hospitals. When the force of union labor had driven prisoners as laborers out of the public streets, out of the public parks, off public works, and from every other place where public moneys were expended for the improvement of the general community, prisoners wearing prison garb were retained as workmen in the public charitable institutions. At a time when it would have meant a riot to have placed prisoners to care for the trees in the parks, to clean the cobblestones in the streets, or even to look after the sewers, the sick poor man, the helpless imbecile, and the abandoned child were left in part to the care of convicts. This was done in the name of charity, but it was such a rank injustice to the individual, such a blot on the civilization of the community, that the long-growing and firmly founded conviction of earnest students of sociology rebelled against it and, by energetic insistence won, step by step, a victory over such conditions.

The first great move toward the separation of the dependent poor from criminals was made in the introduction of the trained nurse into the public hospitals. Although that was but little more than a quarter of a century ago, in America, it was potent in its influence, and appealed so strongly to the sense of justice of all communities that to-day every hospital, public or private, has its corps of trained nurses; and the fact that once the place held by the trained nurse was held by a convict in prison garb, is regarded as a barbaric horror. With the elimination of the convict as a nurse in the public hospitals, the cause of progress and reform was encouraged to extend its efforts to the elimination of prison labor in all public charitable institutions. The battle was not an easy one, but the adherents of reform never wavered. They were confronted by old theories and old customs. Chief among these was that which held that prison labor should be utilized and that inasmuch as the institutions that took care of the sick and the poor had always been associated intimately with those that punished the prisoners, it was economy on the part of the State to utilize the labor of the prisoner in the care of the sick and the poor. Changes of government in public charitable institutions, brought about by changes in political domination, retarded the victory, because new men coming into office had to go over all the ground that had been gone over by their predecessors, and often when they were in a frame of mind to take the necessary step forward, they were replaced by some political change which forced a new man into government, and left him in a like position to that occupied by his predecessor at the beginning of his term of office. But the conviction of the justice of the cause had grown so firmly that it was prepared to overcome all obstacles. It was persistent and insistent. It knew that it was right and it would not acknowledge defeat. The final outcome was that prison labor at the end of the 19th century was practically eliminated from public charitable institutions. The sentiment of communities had forced the powers that had the appropriation of public moneys to increase the appropriations for public charitable institutions to the extent that honest, self-respecting, paid labor, could be employed to care for the sick and the poor in public institutions. With that victory gained, it is not probable that there will ever be a relapse into the practice of using prison labor in any degree in public charitable institutions. The divorce between the prisoner and the pauper to-day is complete in almost every civilized community. Justice and humanity and charity will compel this divorce to stand.

Public sentiment has gone even further than the separation of prisoner and pauper. It has gone deep into the study of the condition of children, looking always to the best chance to develop a dependent child, or a criminal child, into a good citizen. It has recognized that environment is a powerful factor in the development of character, and one of its chief endeavors has been to disassociate the plastic mind of childhood from impressions that would tend to retard reform in a child already started on the downward path, as well as to protect a child not contaminated by vicious surroundings from influences tending to contaminate it. The crowning work of this endeavor has been the establishment of children's courts, wherein the cases of children charged with crime are tried, free from even the sight of adult criminals. Further than this, it has been brought about that the adult pauper and the dependent child

are segregated through the agency of established bureaus for the care of dependent children, protecting them from contact with adult paupers.

The theory and practice of modern charity does not stop with the treatment of conditions as they are found. It has gone deep into the subject and has found that in past ages, too much attention has been given to effect and too little to cause. It recognizes that if a poor man falls ill, it is economy on the part of the State to make him well in as short a time as possible, not only that he may not be a burden in the hospital, but that he may return to the support of his wife and family. To this end, it has built more and better hospitals for his care. It has looked into the causes that led to his sickness, and having found these in wretched dwellings and unsanitary surroundings, it has, through the agency of tenement house reform, sought to bring about conditions of living that, in a great measure, will prevent sickness. It is recognized that it is economy on the part of the State, to take a homeless and friendless child and give it a good physical foundation for a healthy mind in a healthy body. It is recognized that the morally imperfect child should be taken in hand as soon as possible and trained under moral influences, so that the imperfection may be removed. To bring this about, sociology has not been satisfied with the mere treatment of the child as it was found, but it has studied the origin of the child and has sought to remove the causes that produced such results, in order that other similar results should not have to be treated by the State. Out of this theory and practice, have grown day nurseries, kindergartens, manual training schools, and numerous other similar institutions, supported by public or private charity, all striving to remove evil influences and replace them with good influences. Not only do the day nurseries take care of children while their mothers work, but they teach the mothers how to care for the children physically and morally. Kindergartens give the first rudiments of education, and manual training schools lay the foundation for useful occupations. These institutions, by suggestion and encouragement, increase the sense of responsibility on the part of parents, and thus render a priceless service to the community.

In the broadest sense, all men may be said to need help. Interchange of service is a necessity in the economic structure. Charity is not confined to the mere giving of alms. At some time or other in his experience, every man has felt the need of a helping hand. He may not have needed money, but he has needed advice, or kindness, or sympathy. At some time or other, everyone has felt the need of something from another, and the filling of that need is charity. It may be sometimes indefinable, but it exists, and the realization of its existence has caused the development of that vast system of help in civilized countries which is designated by the general term charities. The impulse to relieve distress is almost universal, but how to give and when to give is a problem that must be seriously considered, for it is not infrequently the case that giving does harm. The first appeal for alms is always the most difficult. No person ever asked for alms without, in the first instance, feeling a loss of self-respect. The second asking is easier than the first, and the third than the second, and so on until finally a beggar, without self-respect, is made. It were better in many instances to have refused the first appeal, and thus thrown the applicant back upon his own resources to meet the emergency that confronted him. It were better in almost all instances to refuse the appeal unless some satisfactory investigation has been made as to the real condition of the applicant. This is particularly true in communities where institutions are provided for the immediate relief of the needy. In most of the great municipalities, there is no need for any one to go without food or shelter, for food and shelter are provided by the State, and are to be had for the asking. It is a recognized truth that the poorest people are the most charitable. This is due to two causes. The first is, that a poor person understands from his own experience what another poor person suffers. The second is that by the force of circumstances poor people live in close juxtaposition, and are subject to the appeals of their neighbors. Out of this comes neighborly charity, which is probably the best form of charity, because there is less chance of imposition, on the one hand, and of unnecessary help, on the other. It is less mistaken than any other form of charity. It finds expression in innumerable ways. The tenement-dweller knows of the want of his neighbor, and gives him a share of his own necessaries. The physician recognizes the impecuniosity of his patient and gives his services free. The retail dealer in his little shop knows the financial condition of his customers and extends credit. The lawyer sometimes makes no charge for his services. The landlord is not insistent on the immediate payment of his rent. The employer often advances wages before the work is done. Neighborly charity takes a hundred other forms and rarely makes a mistake, because the one who lends the helping hand knows the recipient is worthy of it. It is sound and sensible and is the most beautiful form of all charity. But there comes a time when, by demonstrated unworthiness, or continued helplessness, an object of charity breaks the patience or exhausts the resources of the neighborhood, and has to reach out for aid from others. Then it becomes necessary for some organized charity to exert itself. The Church is a powerful organization in extending charity. Churches of all denominations have always looked after their poor and helpless; and the Church is really the first organized charity. But the question arises as to whether, after all, it is not the duty of the community as a whole, rather than that of the Church, to care for the poor. It is well for the Church to do all that it can, but the fundamental responsibility for the care of the poor rests upon the community. Whatever the Church does lessens the burden upon the State, but the conviction has grown that the State is responsible, and should be held responsible, and this may be said without in any degree lessening the responsibility that any church may feel for the care of its own. Churches are powerless to supply universal co-operation, because of their individual limitations, but they can assist and do assist in a general organization of charity.

Out of this feeling of the necessity for general co-operation in charity, organized charity has grown. To every student of sociology, the conviction comes that organization is necessary in the distribution of charity. The first step in this direction was the formation of relief societies, designed to replace indiscriminate alms-giving by individuals, and intended to increase the funds available for the help of classes that might have been neglected. Then followed the associations for improving the condition of the poor, which were not to deal in relief except in so far as relief might tend to the permanent elevation of those relieved. The relief societies increased in numbers, but the organizations for the improvement of the condition of the poor have generally lost sight of the fundamental purpose of the organization, and have developed into mere relief societies. Neither filled the want, and so a third form of organized charity came into existence. This is designated as "The Charity Organization Society."

The first thing done by the Charity Organization Society is to investigate. On this point, the evidence of Edward T. Devine, Ph.D., general secretary of the Charity Organization Society of the city of New York, may be taken as authoritative. He says in his book, 'The Practice of Charity':

> In modern organized charity, investigation has come to mean something more than it had meant for those who had proclaimed the necessity for discriminating between the deserving and the undeserving. Investigation is not solely or even primarily for the purpose of thwarting the expectations of impostors. It is not even merely a device for preventing the waste of charity upon unworthy objects, in order that it may be used for those who are really in need. Investigation is rather an instrument for the intelligent treatment of distress. It is analogous to the diagnosis of the physician who does not attempt to treat a serious malady from a glance at its superficial indications, but who carefully inquires into the hidden and early manifestations of the disease, and seeks to know as much as possible of the complicating influences with which he must reckon in effecting a cure. Investigation, therefore, while it should never be inconsiderate or blundering, or heartless, must be painstaking, conscientious and honest. This kind of an investigation has been developed as one feature of organized charity and its possibilities have been only gradually unfolded, and they are realized only gradually in the experience of individual workers. A bad investigation may be too full or too meagre, or it may be neither. The investigation is made not for its own sake, but as a necessary step in the careful remedy of the defects or misfortunes that have brought the applicant to seek relief. In the majority of cases, if the investigation is wise and complete, it will reveal personal sources and facts which will enable the situation to be met without calling in outside aid, and in this way, in the large proportion of instances, investigation might be said to become a substitute for relief.

The Charity Organization Society not only insists on investigations, but on co-operation. On this point, Mr. Devine has this to say:

> By co-operation is meant not merely agreement among various societies and organized agencies, upon general plans of co-operation, but rather co-operation in dealing with individual cases of distress upon the basis of facts as ascertained by investigation. It involves, in other words, acceptance of the plan of relief which is calculated to remedy the defects or to supply the deficiencies that have been discovered. This may mean that each of the co-operating individuals or societies shall supplement the efforts of the others by contributing part of the money or work needed, or it may mean that they will agree to a division of the work, each leaving to the other the part for which its facilities are adapted; or it may mean a division of the cases to be dealt with, each agreeing to leave entirely to the other such classes of individuals or families whose needs are to be studied and adequately met by the agency to which they are assigned. One of the simplest forms of co-operation is that between the Church and the relief agency, secured by either directly from the other in the case of a given family, or secured by the agent of the Charity Organization Society from both. In this case, the material needs should be supplied by the relief agency, and the Church should provide the necessary spiritual oversight and the necessary formative influences for the children, and, if necessary, reformative influences for older members of the family. It sometimes happens that the family has no need of reformation; that it contains within itself all the necessary resources for education and training, while the financial income alone is lacking, or not sufficient. Even in such circumstances, another friend may not be unwelcome in sickness or in trouble and in periods of unusual difficulty. Enlargement of social opportunities may all be entirely appropriate.

In order to carry out a scheme so comprehensive as this, a machine was necessary, and charity organization made a machine, not merely to investigate objects of charity and to promote co-operation among all charitable agencies, but to keep a record of all work done in charity, and to employ individuals, competent and trained, to do that work. It has even gone further, and is agitating the possibility of establishing a school for workers in charity, whose ultimate purpose is to receive pay for charitable work. Organized charity, by its insistence upon co-operation and by its intelligent discussion of all matters pertaining to charity, exerts a powerful influence upon the State in its relation to charity. There can be no step backward by the State in its treatment of its dependents, which organized charity will not at once detect and seek to stop. The experience of its years of struggle to benefit the poor must be learned by officials having charge of public charitable institutions, and must be practised by them. The good done by organized charity is not confined to the relief that it gives individuals, or to the fraud that it detects, or to the imposition that it prevents, but it extends to the making of public opinion about charitable matters which forces good government in public charitable institutions. The problems of charity are many and difficult, and humanity has been wrestling with them through the ages, but the sum total of the effort of man to help man, while not wholly satisfactory, is eminently encouraging.

The answer has been made with varying degrees of satisfaction to the question as to what should be done with the insane, the sick poor, the dependent child, the imbecile, the epileptic, and to almost every other class, save one, and that is the adult pauper. This is the hardest of all charitable problems. The old person who is destitute, who is driven to ask and to expect public alms, is practically hopeless under existing conditions. He is a dead leaf fallen from the tree of life, swept away into a corner with a heap of others to await dissolution. There ought to be some greater discrimination in the treatment of adult paupers. Indeed, there ought to be some means of saving certain persons destitute in their old age from the demoralization and degradation of living in public institutions at public expense. The influences that drive an individual into an almshouse ought to be considered in his treatment after he is received there. The man who has tried all his life to be respectable and

independent and has failed, through no lack of effort on his own part, should not be compelled to associate in his last days with the utterly demoralized and vagabond type, that never made an effort to be better than it is. The individual that still preserves some remnant of self-respect should not be compelled to associate with those that have lost all self-respect. Indeed, there are certain persons compelled in their old age to accept public charity that ought not to be sent to an almshouse at all. This idea has been grasped with more or less vagueness in all civilized communities, and efforts have been made to put it into practice. England has made some study of the subject, and Germany has gone so far as to put into practice a scheme to prevent helplessness and resourcelessness in old age. The German scheme compels each man to save during the time that he is able to work, something of his earnings, so that he shall not be destitute when he is no longer able to work. It is really compulsory insurance. German authorities claim that it has worked advantageously, and from the point of view that it has saved some men from destitution in their old age, this cannot be denied. The difficulty about the scheme is, that it may transfer the burden from one class to another. The wages paid for labor in Germany, as in other countries, are not superfluous. Any plan to take away the wages of a working man from his daily necessities, merely to give him a pension when he is old, is not satisfactory unless it can be demonstrated that his wage is in excess of his necessities. It is not charitable to deprive a man of his immediate necessities in order to meet future necessities. It is worse than uncharitable to deprive a man's family of their necessities in order to prevent him from becoming a charge on the community in his old age. It were better to let him use his wage, even all of it, to protect and develop his family, even if the more prosperous members of the community should have to support him in his old age by general taxation. Moreover, there will always be a class, in spite of any system of compulsory insurance, which will not qualify to profit by a pension. There are a thousand causes to prevent a man from going into an insurance scheme, as well as to cause him to drop out of it after he has gone into it; sickness, loss of employment, starvation wages, matters over which he can have no control, will interfere to deprive him of the benefits of such insurance. What is to be done with him then? He must still be taken care of. Therefore, Germany's experiment of compulsory insurance does not solve the problem satisfactorily. The most radical and progressive step taken in the care of the adult pauper was made by New Zealand some five years ago. In the preamble of the Old Age Pension Act, passed by the New Zealand parliament in 1898, these words occur:

> It is equitable that deserving persons who, during the prime of life, have helped to bear the public burdens of the colony by the payment of taxes, and to open up its resources by their labor and skill, should receive from the colony a pension in their old age.

There is no suggestion of charity in this proposition. It is a demand for justice and right. There is nothing said about relief from the burden of the care of these people in their old age, or that it is humane and kindly and charitable to care for them; but the claim is made that it is theirs by right and they ought to have it. On this ground, and this alone, do the New Zealanders, in their legislation, propose to make old age not only comfortable, but honorable in their community. The suggestion here is not one of charity, but of gratitude. The act was passed and is in full operation in New Zealand, but it is too early yet to say what the result will be. By the New Zealanders it is regarded as an experiment. But whatever the result may be, it has at least sounded a new note in the treatment of the aged poor, which is certain to receive an answering echo in the hearts of all who believe in justice.

It may be urged that the New Zealand plan discourages frugality and encourages paternalism. The man who knows that the State is going to take care of him when he shall have reached a certain age, will not make as great an effort to prosper as the man who knows that his comfort in old age will have to depend upon the fruits of the labor of his youth and full manhood; and there must still be those in every community, even in New Zealand, who do not come under the preamble of the Old Age Pension Act of New Zealand, for there are those who have never helped to bear the public burdens by the payment of taxes, or to open up the resources of the country by their labor and their skill. These, fallen into destitution in their old age, must be taken care of in some way. If they are to be taken care of outside of the Old Age Pension Act, then it does not answer the question. If they are to be included in the Pension Act, in spite of their non-productiveness, then the man who is worthless as a member of the community is treated on the same plane as the one who is worthy, and a premium is placed on worthlessness. There ought to be some better solution of this problem of caring for the respectable destitute person than that contained in either the German insurance scheme or the New Zealand Old Age Pension Act. There is no doubt that the community owes something to an individual who has worked all his life. Such a person should not be sent to the almshouse when he can work no longer. He should be able to go to the treasury of the community, not as an applicant for alms, but as a claimant for his own, and say, "The fruit of my labor is shown in the general prosperity of this community. Certain conditions have interfered with my sharing in that prosperity sufficiently to protect me from want in my old age, but by right and justice a share is mine, and I have come to collect it." At least enough to keep him supplied with the necessaries of life should be at his command on the establishment of his rightful claim to it, and there should be no difficulty in his getting it. Just how this can be done is a problem for students of sociology. New Zealand has taken a novel step, and the world is watching the outcome. It is not a question of charity, but a question of right, growing out of charity, and the answer will come, even as all the other answers to difficult problems in relation to the human race have come, through the best, the most disinterested, and the most earnest thought of the world.

JOHN W. KELLER,
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Chariton, kăr'ĭ-tŏn, Greek prose writer: fl. 5th or 6th century A.D. He was the author of a romance which describes the loves and adventures of Chæreas and Callirrhoë. Critics generally think that the birthplace usually assigned to the author is fictitious, and that it is by no means certain that he was a native of Aphrodisias in Caria. The romance was first published with a learned commentary by D'Orville (3 vols. 4to, Amsterdam 1750), from a MS. in Florence, the only one yet known.

Chariton, chăr'ĭ tŏn, Iowa, city and county-seat of Lucas County, situated on the Chariton River, and on the Chicago, B. & Q. R.R. It has several manufacturing interests, including flour-mills, carriage factories, and manufactories of agricultural implements. Pop. (1900) 3,989.

Charity, one of the three great theological virtues, consisting of love to God and to men, or the disposition to love God with all our heart and our neighbor as ourselves. In a narrower sense, it signifies kindness and goodwill toward mankind in general, and in a still narrower sense, the giving of alms and the alms itself. Organized charity is the system of poor relief carried out by bodies of a quasi-public character, such as the Charity Organization Society in New York. See PUBLIC CHARITIES.

Charivari, shä-rē-vä-rē, a term used especially in France to denote a mock serenade of discordant music with such accompaniments as tin kettles, shouting, whistling, groaning, hissing, and screaming, and the like, meant for the annoyance and insult of an obnoxious person. The etymology of Charivari is obscure; the Germans translate it by *Katzenmusik*, to which in English cat's-concert, and the American callithumpian concert, correspond. In France, during the Middle Ages, a charivari was generally raised against newly married persons, especially those married for the second time. The term is now sometimes applied to periodicals which ridicule the government's policy and public men.

Charju'i, Bokhara, a town situated on the river Oxus at the point where it is crossed by the railway from Bokhara to the Caspian Sea. Owing to its position it has considerable commercial importance.

Charlemagne, shär'lē-mān. See CHARLES THE GREAT.

Charlemont (shär-lē-mŏń) **and Givet,** zhē-vā, France, a fortified stronghold in the department of the Ardennes. The works occupy both banks of the Meuse, about 25 miles above Namur, at the junction of several roads, on a steep mountain, and completely command the river. They consist of four fortresses, two of which, Charlemont and Great Givet, lie on the left bank of the Meuse, and the other two, Little Givet and Mont d'Haur, upon the right. The fortification is calculated for a garrison of 11,000 men, but in case of necessity can contain 25,000, and may be defended by 3,000 to 4,000. The castle and small town of Charlemont were built in 1555 by Charles V. Louis XIV. enlarged it by fortifying the small town of Givet, which lies at the foot of the hill, and by increasing the fortifications of Charlemont. The Givets and Mont d'Haur capitulated to the Prussians in 1815, but Charlemont, which is almost impregnable, was not taken.

Charleroi, shär-lē-rwä, Belgium, a town in the province of Hainaut, on both sides of the river Sambre, 20 miles east-northeast of Mons, the low town standing on the right and the middle town and high town on the left bank. The only public building of importance is the parish church, which was built by Louis XIV. Charleroi possesses a college, an academy of design, a hospital, and several schools. It stands in a densely populated district with productive coal and iron mines, which have given rise to flourishing industries; it may be considered the centre of the Belgian iron trade. It was fortified by the Spaniards in 1666 and named for Charles II. of Spain. Taken by the French in November 1792, was recovered by the Austrians in June 1793, but it again surrendered to the French in July 1794. Pop. 25,000.

Charleroi, shär-lē-roi', Pa., city of Washington County, on the Monongahela River and on the Pittsburg, V. & C. R.R. Over $2,000,000 of capital is invested in the manufactures here, which include glass-works of various sorts. Pop. (1900) 5,930.

Charles Martel, king of the Franks: b. about 689 A.D.; d. 22 Oct. 741. He was a son of Pepin Héristal (mayor of the palace under the last kings of the Merovingian dynasty). His father had governed under the weak kings of France with so much justice, and so much to the satisfaction of the people, that he was enabled to make his office hereditary in his family. Chilperic II., king of the Franks, refusing to acknowledge Charles Martel as mayor of the palace, the latter deposed him, and set Clothaire IV. in his place. After the death of Clothaire he restored Chilperic, and subsequently placed Thierri on the throne, showing how absolute was the control of the mayor, and that the royal dignity was a mere phantom. Charles Martel rendered his reign famous by the great victory which he gained in October 732, over the Saracens, near Tours, from which he acquired the name of Martel, signifying hammer.

Charles the Great, or **Charlemagne** (CAROLUS MAGNUS), king of the Franks, and subsequently emperor of the west: b. probably at Aix-la-Chapelle 2 April 742; d. there 28 Jan. 814. His father was Pepin the Short, king of the Franks, son of Charles Martel. After the decease of his father, in 768, he was crowned king, and according to the wish of Pepin divided the Frankish dominions with his younger brother, Carloman; but the conditions of this partition were several times altered, without being ever adjusted to the satisfaction of the parties. Their mutual discontent was fostered principally by the king of the Lombards, Desiderius (the father-in-law of both princes), because Charlemagne had repudiated his wife. Desiderius sought revenge for the rejection of his daughter by exciting and encouraging commotions in the realm, in which he was assisted by the circumstance that the nobles aspired to independence. The people of Aquitania were the first who attempted to become independent. Charlemagne marched against them with rather a small army; but he relied on the assistance of his brother, Carloman, to whom a portion of Aquitania then belonged. Carloman appeared, indeed, on the field, but at the decisive moment

deserted his brother, who was obliged to sustain alone an unequal conflict. His great courage and conduct, after a long and doubtful contest, procured him the victory, and the insurgents submitted (770). At Carloman's death in 771, and after the flight of his wife and her two sons to her father in Italy, Charlemagne made himself master of the whole empire, the extent of which was already very great, as it embraced, besides France, a large part of Germany. He now formed the plan of conquering the Saxons, for which his zeal for the diffusion of Christianity served him as a pretence. The Saxons, in possession of Holstein and Westphalia, preferred pillaging to peaceful occupations, and a wandering to a settled mode of life. An irruption into the territory of the Franks was the alleged cause of the first war which Charlemagne began against them in 772. The other wars were produced by the rebellions of this warlike nation, which was never reduced to complete submission till the peace of Seltz, in 803, after it had embraced Christianity. A part of the Saxons Charlemagne removed to Flanders and Switzerland, and their seats were occupied by the Obotrites, a vandal tribe in Mecklenburg. The famous pillars called *Irminsäulen* were destroyed as monuments of pagan worship. During 32 years did the Saxons resist a conqueror who, striving with equal eagerness to convert and to subdue them, never became master of their country till he had transformed it almost into a desert. They might have made a more successful defense had they not been distracted by internal dissensions. The most celebrated of their leaders was Wittikind, and next to him Albio, who finally embraced Christianity in 783.

While he was combating the Saxons on the banks of the Weser, Pope Adrian implored his assistance against Desiderius, who had torn from him the exarchate of Ravenna, which Pepin the Short had presented to the holy see, and who was urging the Pope to crown the nephews of Charlemagne, that Charlemagne himself might be considered a usurper. Charlemagne immediately left Germany and marched with his army to Italy. Desiderius fled to Pavia, which was bravely defended by the Lombards. The city finally fell, and Desiderius, with the widow and sons of Carloman, were carried prisoners to France. Desiderius ended his life in a monastery. In 774 Charlemagne was crowned King of Lombardy with the iron crown.

In 778 he repaired to Spain to assist a Moorish prince, conquered Pampeluna, made himself master of the county of Barcelona, and spread the terror of his name everywhere. But on his return his troops were surprised in the valley of Roncesvalles by some Saracens, in connection with the mountaineers, the Basques, and the rear-guard defeated; remakable from the circumstances that Roland, one of the most famous warriors of those times, fell in the battle. (See RONCESVALLES.) The disaffection of the tribes of Aquitania induced Charlemagne to give them a separate ruler: for this purpose he selected the youngest of his sons, Louis (called le Débonnaire). The Lombards were no less turbulent, and the Greeks made incessant efforts to reconquer Italy; and the nobles to whom he had intrusted a part of the sovereignty of this country, evinced little fidelity. He therefore gave them his second son, Pepin, for a monarch; his eldest son, Charles, remaining constantly with him, and assisting him in his manifold undertakings. In 781 he caused these two sons to be crowned by the Pope in Rome, hoping to render the royal dignity inviolable in the sight of the people. Charlemagne had another son, also called Pepin, who was the oldest of all his children, being the son of his divorced wife. This circumstance probably inspired the monarch with an aversion to the elder Pepin, and prevented him from admitting him to a share in the government.

After returning from Spain Charlemagne was again obliged to take the field against the Saxons. The year 790, the 22d of his reign, was the only one which he passed without taking up arms. As his power increased, he meditated more seriously the accomplishment of the plan of his ancestor, Charles Martel, to restore the Western Empire. On Christmas Day (800) he was proclaimed Cæsar and Augustus by Pope Leo III.; he was invested with the ornaments of the ancient Roman emperors, and the only thing forgotten was, that the empire could not subsist long in a family where the authority was, by law, divided among the children of the deceased monarch. Pepin, king of Italy, died in 810, and his death was followed the next year by that of Charles, the eldest. Thus of his legitimate sons only one remained, Louis, king of Aquitania, whom Charlemagne adopted as his colleague in 813. He was buried at Aix-la-Chapelle, his favorite and usual place of residence. He was deposited in a vault, where he was placed on a throne of gold, in full imperial costume. The sepulchre was sealed, and over it was erected a kind of triumphal arch, on which were the words, «Here lies the body of Charles, the great and orthodox emperor, who gloriously enlarged, and for forty-seven years happily governed, the empire of the Franks.»

Charlemagne was a friend of learning; he deserves the name of restorer of the sciences and teacher of his people. He attracted by his liberality the most distinguished scholars to his court; among others, Alcuin, from England, whom he chose for his own instructor; Peter of Pisa, who received the title of his grammarian; and Paul Warnefried, better known under the name of Paulus Diaconus, who gave the emperor instruction in Greek and Latin literature. By Alcuin's advice, Charlemagne established an academy in his palace at Aix-la-Chapelle, the sittings of which he attended with all the scientific and literary men of his court — Leidrades, Theodulphus, the archbishops of Trèves and Mentz, and the Abbot of Corvey. All the members of this academy assumed names characteristic of their talents or inclinations. One was called Damætas, another Homer, another Candidus; Charlemagne himself took the name of David. From Italy he invited teachers of the languages and mathematics, and established them in the principal cities of his empire. In the cathedrals and monasteries he founded schools of theology and the liberal sciences. He strove assiduously to cultivate his mind by intercourse with scholars; and, to the time of his death, this intercourse remained his favorite recreation. His mother-tongue was a form of the Teutonic, but he spoke several languages readily, especially the Latin. He was less successful in writing, because he had not applied

himself to it till he was further advanced in years. In the winter he read much, and even caused a person to read to him while he took his meals. He endeavored to improve the liturgy and church music. He was desirous of introducing the Roman liturgy into his states; but the clergy, who clung to the ancient usages, offered some resistance. Several churches, however, complied with the wish of the monarch, and others mingled the Roman and Gallican liturgy. He attempted to introduce uniformity of measures and weights, but was unable to accomplish his design. Another great plan of his was to unite the Rhine with the Danube, and consequently the Atlantic with the Black Sea, by means of a canal. The whole army was employed on the work; but its accomplishment was prevented by want of knowledge of hydraulic architecture. The arts, however, under his patronage, produced other monuments of his fame. The city of Aix-la-Chapelle received its name from a splendid chapel which he caused to be built of the most beautiful Italian marble. The doors of this temple were of bronze, and its dome bore a globe of massive gold. The imperial palace was built in the highest style of splendor. Charlemagne also erected baths, in which more than one hundred persons could swim in warm water. He was himself very fond of swimming, and frequently used these baths, with all the nobles of his court, and even with his soldiers. At Seltz, in Alsace, he had a no less splendid palace. To Charlemagne France is indebted for its first advances in navigation. He built the lighthouse at Bologne, and constructed several ports. He encouraged agriculture, and made himself immortal by the wisdom of his laws. Thus his law *de villis* is esteemed a monument of his views on rural economy. His fame filled even the East. He received ambassadors from the patriarch of Jerusalem, from the Emperors Nicephorus and Michæl, and was twice complimented with embassies from Harun al-Rashid, the famous caliph of Bagdad, all of which he received with a splendor unexampled even in the East. He convened councils and parliaments, published capitularies, wrote many letters (some of which are still extant), a grammar, and several Latin poems. His empire comprehended France, most of Catalonia, Navarre, and Aragon; the Netherlands, Germany as far as the Elbe, Saale, and Eyder, Upper and Middle Italy, Istria, and a part of Sclavonia.

In private life Charlemagne was exceedingly amiable: a good father and generous friend. His domestic economy afforded a model of frugality; his person, a rare example of simplicity and greatness. He despised extravagance of dress in men, though, on solemn occasions, he appeared in all the splendor of majesty. His table was very plain. He was large and strong; his height, according to Einhard, equaled seven times the length of his foot. His head was round; his eye large and lively; his nose of more than common size; his countenance had an agreeable expression of serenity. His gait was firm; his bearing manly. He enjoyed perfect health till the last four years of his life, when he was attacked by fevers, and began to limp. In summer he was accustomed to repose for two hours after dinner, but at night he slept uneasily. He wore the dress of his country; on his body a linen shirt, over which was a coat with a silk border, and long breeches. For his outer dress he wore a cloak, and always his sword, the hilt and belt of which were of gold and silver. He possessed a natural, impressive eloquence, and in his expression of countenance there was something to excite respect, united with gentleness and kindness. See Einhard, 'Vita Caroli Magni'; Gaston Paris, 'Histoire Poétique de Charlemagne' (1865); Guizot, 'Charlemagne and the Carlovingians' (1880); Brosien, 'Karl der Grosse' (1885); Mombert, 'History of Charles the Great' (1888); Burr, 'Charlemagne' (1888); Hodgkin, 'Charles the Great' (1897); Dairs, 'Charlemagne' (1900).

Charles I., king of Great Britain and Ireland: b. Dunfermline, Scotland, 19 Nov. 1600; d. London 30 Jan. 1649. He was the third son of James VI. and Anne of Denmark. Soon after the birth of his son James succeeded to the crown of England, and on the death of Prince Henry in 1612, Robert, the second son, having died in infancy, Charles became heir-apparent, but was not created Prince of Wales till 1616. Little is recorded of him previous to his romantic journey into Spain in company with Buckingham, in order to pay his court in person to the Spanish infanta. Through the arrogance of Buckingham this match was prevented, and the prince was soon after contracted to Henrietta Maria, daughter of Henry IV. of France. In 1625 he succeeded to the throne on the death of his father. The first Parliament which he summoned, being much more disposed to state grievances than grant supplies, was dissolved; and by loans and other expedients an expedition was fitted out against Spain which terminated in disgrace and disappointment. In the next year a new Parliament was summoned, and the disgust and jealousy prevailing between the king and this assembly laid the foundation of the misfortunes of his reign. The House of Commons held fast the public purse, and he intimated a design of following new counsels should they continue to resist his will, and suddenly and angrily dissolved them, after a short session, while they were preparing a remonstrance against the levying of tonnage and poundage without consent of Parliament. Charles then began to employ his threatened mode of raising funds by loans, benevolences, and similar unpopular proceedings; which, however partially sanctioned by precedent, were wholly opposed to the rising notions of civil liberty, and to the constitutional doctrine which rendered the Commons the guardian and dispenser of the public treasure. His difficulties were further increased by a war with France, intended to gratify the private enmity of Buckingham, who added to the odium against him by an ill-fated expedition to assist the Huguenots of Rochelle.

In 1628 the king was obliged to call a new Parliament, which showed itself as much opposed to arbitrary measures as its predecessor, and after voting the supplies prepared a bill called "A Petition of Right, Recognizing all the Legal Privileges of the Subject," which, notwithstanding the employment of all manner of arts and expedients to avoid it, Charles was constrained to pass into a law.

The assassination of Buckingham soon after by Felton removed one source of discord, but the Parliament which met in January 1628 manifested so determined a spirit against the king's claim of levying tonnage and poundage by his own authority, that it was suddenly dissolved, and Charles was determined to try to reign without one. For this purpose, having judiciously terminated the pending wars between France and Spain, he raised Sir Thomas Wentworth, afterward so celebrated as Lord Strafford, to the principal place in his councils. This able statesman had begun his political career in opposition to the court, but having been gained over, was by his austerity, talent, and firmness, an exceedingly fit instrument to curb the spirit of resistance to prerogative, which had become so strong among the Commons. In ecclesiastical affairs Charles, unhappily for himself and the Church, was guided by the counsels of Laud, then bishop of London, a prelate whose learning and piety were accompanied by a zeal as indiscreet as intolerant.

Under these counsels about 11 years passed away in the execution of plans for raising money without the aid of Parliament, with other dangerous expedients. The arbitrary courts of high commission and star chamber, in the hands of Laud, also exercised in many instances the most grievous oppression. In 1634 ship money began to be levied, which being strictly applied to naval purposes, the nation at large acquiesced in it with less than usual repugnance; and some writers, who courageously attacked the court against the principle, were treated with so much severity that others were deterred from following their example. So desperate did the cause of liberty at this time appear, that great numbers of the Puritans emigrated to New England, and by order of the court a ship was prevented from sailing, in which were Sir Arthur Hazelrig, John Hampden, and Oliver Cromwell. It was in 1637, not long after this remarkable event, that Hampden commenced the career of resistance by refusing to pay ship money, the right to levy which, without authority of Parliament, he was determined to bring before a court of law. His cause was argued for 12 days in the court of exchequer; and although he lost it by the decision of 8 of the judges out of 12, the discussion of the question produced a very powerful impression on the public mind.

It was in Scotland, however, that formal warlike opposition was destined to commence. From the beginning of his reign Charles had endeavored to introduce into that country a liturgy copied from the English — an innovation which produced the most violent tumults, and ended in the formation of the famous «Covenant» in 1638, by which all classes of people mutually engaged to stand by each other. The Covenanters levied an army, which the king, opposed by an ill-disciplined English force, so equivocally inclined, that, not able to trust it, Charles agreed to a sort of pacification. His finances being exhausted, after an intermission of 11 years he again assembled a Parliament, which, as usual, began to state grievances previous to granting supplies. Losing all patience, he king once more hastily dissolved it, and prosecuted several members who had distinguished themselves by their opposition. Raising money in the best manner he could devise, an English army was again made to proceed toward the north; but, being defeated by the Scots, it became obvious that affairs could no longer be managed without a Parliament, and in 1640 that dreaded assembly was again summoned, which proved to be the famous Long Parliament, whose career forms so memorable a portion of English history. Charles soon found himself obliged to be a comparatively passive spectator of the ascendency of the democratic portion of the Constitution, and was obliged, both in Scotland and in England, to yield to the torrent which assailed him.

In the meantime a flame burst out in Ireland, which had no small effect in kindling the ensuing conflagration at home. The oppressed Roman Catholic population of that country, during the confusion of the times, rose against the government for the purpose of regaining their rights. Very exaggerated accounts of the massacre of the Protestants are given by several of the historians. Later writers have established the fact that the number who perished in this insurrection was not great.

The Parliament being summoned, the king left the conduct of the war entirely to it; but it now became evident that the Commons intended systematically to pursue their advantages, and to reduce the crown to a state of complete dependence. They framed a remonstrance containing a recapitulation of all the errors of the reign; renewed an attempt for excluding bishops from the House of Lords; passed ordinances against superstitious practices and so inflamed the popular odium against the Episcopal orders as to intimidate its members from attending to their duty in Parliament.

At length, it being apparent that either zealous adherents of prerogatives, or those anxious to establish the government on a more democratic basis, must give way, Charles caused his attorney-general to enter, in the House of Peers, an accusation against five leading members of the Commons, and sent a sergeant-at-arms to the House to demand them. Receiving an evasive answer, he, the next day, proceeded himself to the House, with an armed retinue, to seize their persons. Aware of this intention, they had previously withdrawn; but the king's appearance with a guard caused the House to break up in great disorder and indignation. The accused members retired into the city, where a committee of the House was appointed to sit, and the city militia was mustered under a commander appointed by Parliament, which also demanded the control of the army. Here the king made his last stand, the matter having now arrived at a point which arms alone could decide. The queen fled to Holland to procure ammunition, and Charles, with the Prince of Wales, proceeded north, and for a time fixed his residence at York. The king was received in his progress with great demonstrations of loyalty from the gentry; and many eminent and virtuous characters, the conscientious opposers of his arbitrary measures in the first instance, now joined his party. On the other hand, all the Puritans, the inhabitants of the great trading towns, and those who had adopted republican notions of government, sided with the Parliament; and in no public contest was more private and public virtue ranged on both sides, however alloyed, as in all such cases, with ambition, bigotry, and the baser passions. The first action of consequence was the battle of Edge Hill

23 Oct. 1642, which, although indecisive, enabled the king to approach London, and produce considerable alarm. Nothing decisive, however, happened against the royal side till the battle of Marston Moor in 1644, which was gained chiefly by the skill and valor of Cromwell. The succeeding year completed the ruin of the king's affairs, by the loss of the battle of Naseby.

Thenceforward a series of disasters attended his armies throughout the kingdom, and he took the resolution of throwing himself into the hands of the Scottish army, then lying before Newark, 5 May 1646. He was received with respect, although placed under guard as a prisoner; and, a series of abortive negotiations ensuing, an agreement was made with Parliament to surrender him to their commissioners, on the payment of a large sum, claimed as arrears by the Scottish army. The king was accordingly surrendered to the commissioners appointed 30 Jan. 1647, and carried, in the first place, to Holmby House, in Northamptonshire; subsequently, to the headquarters of the army at Reading; and soon after to Hampton Court. In the meantime, however, the army and Independents becoming all powerful, he was led into some fears for his personal safety, and, making his escape with a few attendants, proceeded to the south coast. Not meeting a vessel, as he expected, he crossed over to the Isle of Wight, and put himself into the hands of Hammond, the governor, by whom he was lodged in Carisbrooke Castle.

While the king was in this situation, the Scots, regretting the manner in which they had delivered him up, and indignant at the proceedings of the English, marched a considerable army to his relief, under the Duke of Hamilton. This force, although strengthened by a large body of English royalists, was entirely routed and dispersed by Cromwell at Preston, as were the insurgents in Kent and Essex by Fairfax. During this employment of the army and its leaders a new negotiation was opened with the king in the Isle of Wight, who agreed to nearly everything demanded of him, except the abolition of Episcopacy; and so much had it now become the interest of the Parliament itself to comply with him, that a vote was at length carried, that the king's concessions were a sufficient ground for a treaty. The triumphant army, however, on its return, cleared the House by force of all the members opposed to its views; and thereby procuring a reversal of this vote, the king's person was again seized, and, being brought from the Isle of Wight to Hurst Castle, preparations were made for trying him on the capital charge of high treason against the people. As the House of Lords refused to concur in a vote for this purpose, the Commons declared its concurrence unnecessary; and the king, being conducted to London and stripped of all ensigns of royalty, was brought before the court of justice specially erected for this unprecedented trial, on 20 Jan. 1649.

The behavior of Charles had been calm and dignified throughout his adversity, and in no respect was it more so than on this occasion. Three times he objected to the authority of the court when brought before it, and supported his refusal by clear and cogent arguments. At length, evidence being heard against him on the proof that he had appeared in arms against the parliamentary forces, sentence of death was pronounced against him. He requested a conference with both Houses, which was rejected, and only three days allowed him to prepare for his fate. After passing the three days in religious exercises, and in tender interviews with his friends and family, he was led to the scaffold. His execution took place before the Banqueting House, Whitehall, on 30 Jan. 1649, where, after addressing the people around him with great firmness and composure, the ill-fated king submitted to the fatal stroke.

Thus died Charles I., in the 49th year of his age. He was, in an eminent degree, temperate, chaste, and religious, and although somewhat cold and reserved in demeanor, was really kind and affectionate. His talents were also considerable; but he was deficient in the decision and self-reliance necessary to superior executive ability. His mind was cultivated by letters and a taste for the polite arts, particularly painting, the professors of which he munificently encouraged; and his collections of work on art show judgment in the selection. To all these personal and private requirements he joined a graceful figure and pleasing countenance, and, under happier circumstances, would doubtless have been regarded as a very accomplished sovereign.

With respect to his political character, as exhibited in the great struggle between himself and the Parliament, it is impossible not to perceive that he strove to maintain a portion of prerogative that had become incompatible with any theory of civil and religious liberty; but it is equally certain that he only sought to retain what his predecessors had possessed. There are periods in the history of every people in which old and new opinions conflict, and a concussion becomes unavoidable; and it was the misfortune of Charles to occupy the throne at a time when the development of the representative system necessarily brought it into conflict with the claims of prerogative. If the Parliament had acquiesced in the kingly pretensions, as usually explained by Laud and the high churchmen of the day, it would have dwindled into a mere registry of royal edicts, like those of France. On the other hand, Charles acted a part which every monarch in his situation may be expected to act; for a philosophical appreciation of the true nature of a political crisis is scarcely to be expected from one who sits upon a throne. The most forcible accusation against Charles is on the score of insincerity. It is asserted that he never intended to fulfill the conditions imposed upon him. This can scarcely be denied; but it is equally certain that some of them might justly be deemed questionable, and may even have been imposed in order to produce that conduct in the king which so naturally followed. See Chancellor, 'Life of Charles I., 1600–25' (1886); Skelton, 'Life of Charles I.' (1898); S. R. Gardiner, 'History of the Great Civil War.'

Charles II., king of Great Britain and Ireland, son of Charles I. and Henrietta Maria of France: b. London 29 May 1630; d. there 6 Feb. 1685. He was a refugee at The Hague on the death of his father, on which he immediately assumed the royal title. He listened to an invitation from the Scots, who had proclaimed him

their king 5 Feb. 1649, and arrived in the Cromarty Firth 16 June 1650. Being obliged to throw himself into the hands of rigid Presbyterians, they subjected him to many severities and mortifications, which caused him to regard that sect ever after with extreme aversion. In 1651 he was crowned at Scone; but the approach of Cromwell soon rendered his abode in Scotland unsafe. Hoping to be joined by the English royalists, he took the spirited resolution of passing Cromwell and entering England, Carlisle readily throwing open its gates to receive him. He was immediately pursued by that active commander, who, with a superior army, gained the battle of Worcester, and Charles, after a variety of imminent hazards, being on one occasion sheltered for 24 hours in the branches of the famous Boscobel oak, reached Shoreham, in Sussex, and effected a passage to France.

It is the province of history to state the circumstances that produced the Restoration, which Gen. Monk so conducted that Charles, without a struggle, succeeded at once to all those dangerous prerogatives which had cost the nation so much blood and treasure, first to abridge and then to abolish. On 29 May 1660, Charles entered his capital amid universal and almost frantic acclamations; and the different civil and religious parties vied with each other in loyalty and submission. His first measures were prudent and conciliatory. Hyde, Lord Clarendon, was made chancellor and prime minister; and an act of indemnity was passed, from which those alone were excepted who were immediately concerned in the late king's death. A settled revenue was accepted in lieu of wardship and purveyance, and the army was reduced. In respect to religion, there was less indulgence; for not only were prelacy and the parliamentary rights of bishops restored, which was to be expected, but an act of uniformity was passed, by the conditons of which nearly all the Presbyterian clergy were driven to a resignation of their livings. In 1662 he married the Infanta of Portugal, a prudent and virtuous princess, but in no way calculated to acquire the affection of a man like Charles. The indolence of his temper and the expenses of his licentious way of life soon involved him in pecuniary difficulties; and the unpopular sale of Dunkirk to the French was one of his most early expedients to relieve himself.

In 1663 a rupture took place with Holland. It was attended, in the first instance, by various naval successes; but France and Denmark entering into the war, as allies of the Dutch, the English were overmatched, and a Dutch fleet entered the Thames, and, proceeding up the Medway, burned and destroyed ships as high as Chatham. The domestic calamities of a dreadful plague in 1665, and of the great fire in London in 1666, added to the disasters of the period. Soon after, Clarendon, who had become very unpopular, and was personally disagreeable to Charles, was dismissed, and sought shelter from his enemies by a voluntary exile. A triple alliance between England, Holland, and Sweden, for the purpose of checking the ambition of Louis XIV., followed. It did honor to the political talents of Sir William Temple, and was one of the few public measures of the reign which deserve approbation. In 1670 Charles threw himself into the hands of the five unprincipled ministers, collectively denominated the cabal, who supported him in every attempt to make himself independent of Parliament. The party troubles of this reign commenced about this time by the open declaration of the Duke of York, presumptive heir to the crown, that he was a convert to the Roman Catholic religion. Soon after the ministry broke the triple alliance, and planned a rupture with the Dutch; and as the king did not choose to apply to Parliament for money to carry on the projected war, he caused the exchequer to be shut up in January 1672. The naval operations against the Dutch were by no means successful, and a new Parliament being called, which strongly expressed the discontent of the nation, the cabal was dissolved, and a separate peace made with Holland in 1674. Divisions in the cabinet, fluctuations in the king's measures, and parliamentary contests followed, and occupied the next three years, till, in 1677, Charles performed a popular act, by marrying his niece, the princess Mary, to the Prince of Orange. By taking some decided steps in favor of the Dutch he also forwarded the Peace of Nimeguen in 1678. The same year was distinguished by the pretended discovery of the popish plot for the assassination of the king, and the introduction of the Roman Catholic faith. Notwithstanding the infamous characters of Oates and Bedloe, and the improbable nature of their disclosures, their tale, supported by the general suspicions of the secret influence of a Catholic faction, met with universal belief; the Parliament exhibiting nearly as much credulity and heat as the masses. Many Catholic lords were committed; Coleman, the Duke of York's secretary, and several priests hanged; and a venerable nobleman, the Earl of Stafford, beheaded. The Duke of York thought fit to retire to Brussels, and a bill for his exclusion from the throne passed the House of Commons. Such was the state of the country that Charles was obliged to give way to some popular measures, and the great palladium of civil liberty, the Habeas Corpus bill, passed during this session. The temper of the Parliament was so much excited that the king first prorogued and then dissolved it. The court now sought to establish a balance of parties; to distinguish which, the terms Whig and Tory were about this time brought into use.

In 1680 a new Parliament assembled, and the Commons again passed the Exclusion Bill, which was rejected by the Lords. This Parliament was also dissolved in the next year, and a new one called at Oxford, which proved so restive, that a sudden dissolution of it ensued; and, like his father, Charles determined henceforward to govern without one. By the aid of the Tory gentry and the clergy he obtained loyal addresses from all parts of the kingdom, and attachment to high monarchical principles came again into vogue. The charge of plots and conspiracies was now brought against the Presbyterians. The Nonconformists, generally, were also treated with much rigor; and a step of great moment, in the progress to arbitrary power, was the instituting suits at law (*quo warrantos*) against most of the corporations in the kingdom, by which they were intimidated to a resignation of their charters, in order to receive them back so modeled as to render them much more dependent than before. These rapid strides toward the destruction of liberty at length produced the celebrated Rye House plot,

the parties to which certainly intended resistance; but that the assassination of the king was ever formally projected seems very doubtful. It certainly formed no part of the intention of Lord William Russell, whose execution, with that of Algernon Sidney, on account of the plot, forms one of the striking events of this disgraceful reign.

Charles was at this time as absolute as any sovereign in Europe; and had he been an active prince, the fetters of tyranny might have been completely riveted. Scotland, which at different periods of his reign had been driven into insurrection by the arbitrary attempts to restore Episcopacy, was very nearly dragooned into submission; and the relics of the Covenanters were suppressed with circumstances of great barbarity. At his death he received the sacrament according to the rites of the Catholic Church.

The character of Charles II. requires little analysis. He was a confirmed sensualist and voluptuary; and his reign was the era of the most dissolute manners that ever prevailed in England. The stage was an open school of licentiousness, and polite literature was altogether infected by it. Charles was a man of wit, and a good judge of certain kinds of writing, but too deficient in sensibility to feel either the sublime or the beautiful in composition; neither was he generous even to the writers whom he applauded. He possessed an easy good nature, but united with it a total indifference to anything but his own pleasure; and no man could be more destitute of honor or generosity. His ideas of the relation between king and subject were evinced by his observation on Lauderdale's cruelties in Scotland: "I perceive," said he, "that Lauderdale has been guilty of many bad things against the people of Scotland; but I cannot find that he has acted in anything contrary to my interest." Yet, with all his selfishness and demerits as a king, Charles always preserved a share of popularity with the multitude from the easiness of his manners. Pepy's 'Memoirs' and other private documents, however, clearly show the opinion of the more reflecting portion of his subjects; and it is now pretty generally admitted that, as he was himself a most dishonorable and heartless monarch and man, so his reign exhibited the English character in a more disgraceful light than any other in English history. It need not be added that he left many illegitimate children, the descendants of some of whom are still among the leading nobility of the country. The fate of his most distinguished son, the ill-fated Duke of Monmouth, is an affair of history.

Charles (shärl) **I.** ("le Chauve," or "the Bald"), king of France, son of Louis le Débonnaire: b. Frankfort-on-the-Main 13 June 823; d. 877. He was invested by his father with the kingdoms of Alemania, Burgundy, Provence, and Septimania, and subsequently with that of Aquitaine. On Louis' death in 840, Charles found himself confronted with two enemies — his half-brother Lothaire, who, as eldest son, claimed the whole of the Frank empire of Charlemagne, and his nephew Pepin, who asserted, in right of his father, a preferable claim to the sovereignty of Aquitaine. After considerable bloodshed, a treaty was entered into between Charles and Lothaire at Verdun, by which the former received, as his share of the dominions of Charlemagne, all those territories comprehended between the ocean on the one part, and the Meuse, the Scheldt, the Saône, the Rhone, and the Mediterranean on the other. His struggle with Pepin was long and obstinate, and in 844 he was obliged to recognize him as king of southern Aquitaine. In 875, by the death of his nephew, the Emperor Louis II., he gained possession of the imperial crown, and thereby provoked the hostility of his brother, Louis the German, who ravaged the territory of Champagne, and otherwise committed great havoc in his dominions. In 877 he proceeded to Italy on a crusade against the Saracens, to which he had been summoned by the Pope, but died when crossing Mount Cenis.

Charles II. ("le Gros," or "the Fat"), king of France, also known as Charles III., emperor of Germany: b. about 832; d. Neidingen, Suabia, 13 June 888. He was the son of Louis the German, and the grandson of Louis le Débonnaire, and was recognized as emperor of Germany by the Pope. In 885 he ascended the French throne, to the prejudice of his cousin, Charles the Simple, whose youth prevented him from asserting his rights, but in 887 was deposed, and the following year died miserably, strangled, as is asserted, by his servants.

Charles III. ("the Simple"), king of France, the posthumous son of Louis the Stammerer: b. 17 Sept. 879; d. 929. On his father's death France was divided between Charles' two brothers, Louis III. and Carloman, and an aristocratic oligarchy. On the death of his brothers he ought in right to have ascended the throne, but his extreme youth prevented his claims being recognized, and his cousin, Charles the Fat, was proclaimed king in 885. On the deposition of the latter in 887 Count Eudes of Paris succeeded in obtaining the crown; but his death in 898, left Charles undisputed king of the whole country. The reign of Charles is chiefly noted for the piratical incursions of the Northmen or Normans, who ravaged the coasts of France, sailed up the principal rivers, and spread such dismay that, to conciliate them and put an end to their devastations, he agreed to cede to their chief, Rollo, the territory of Normandy, to be held as a fief of the French crown. Latterly also Charles' tranquillity was much disturbed by the turbulence of some of his great vassals, who broke into open rebellion, declared the throne forfeited, and proclaimed as king, Robert, brother of Count Eudes. Through the treachery of Herbert, Count of Vermandois, Charles was inveigled into the town and imprisoned in the fortress of Peronne. From this he was only liberated a short time before his death.

Charles IV. ("the Fair"), king of France, third son of Philippe le Bel: b. 1294; d. 1328. In virtue of the salic law he ascended the throne in 1322, to the exclusion of the daughters of Philip the Long. He reigned six years, dying in 1328 without male issue, the last of the direct line descended from Hugh Capet. Isabella, his sister, married Edward II. of England, and was materially aided by Charles in fitting out, along with her paramour Mortimer, the expedition which resulted in the dethronement of her husband.

Charles V. ("the Wise"), king of France, son of John II.: b. Vincennes 21 Jan. 1337; d. there 16 Sept. 1380. While Duke of Normandy, and during the captivity of his father in England, after the battle of Poitiers, he took the title of lieutenant of the kingdom. The vices and extravagance of the court were extreme, and the demands of the States-General for reform, headed by Stephen Marcel, provost of the merchants of Paris, were loudly and persistently urged. This assembly was supported in its claims by Charles the Bad, king of Navarre, who, as grandson of Louis le Hutin, maintained a preferable right to the crown. By artfully temporizing Charles contrived to detach the leading orders from the cause of the states, and having brought about indirectly the assassination of Marcel, succeeded in crushing their party. Meantime his father John still continued in captivity in England till liberated by the Treaty of Brétigny in 1360. Four years afterward he died, leaving Charles as successor to the French crown. The reign of the latter presents a series of combined hostilities and intrigues carried on with the view of establishing his power and extending his dominions. In these he was so far successful as to keep at bay the king of Navarre and deprive the English of a great part of their possessions in France. The magnanimity and wisdom of Charles have been greatly commended by some writers, and if we make due allowance for the times in which he lived, the high character which these have assigned him may not appear overcharged. That in his public administration, however, he was guilty of various acts of perfidy and cruelty cannot be disputed. He possessed some literary tastes, and was the founder of the Bibliothèque Royale. A less beneficial act was the erection of the Bastile, for the purpose of overawing the Parisians, whose outbreaks he had found reason to dread.

Charles VI. ("the Silly"), king of France, and son of Charles V.: b. Paris 3 Dec. 1368; d. 21 Oct. 1422. When his father died he was not 12 years old, and the contending pretensions of his uncles, the Dukes of Anjou, Berry, Burgundy, and Bourbon, rendered his minority a scene of unbounded turbulence and license. In 1385 he was married at Amiens to Isabella of Bavaria. In 1388 he declared himself independent of guardians, and took the reins of government into his own hands. His mild and amiable, though somewhat dissipated character, had already secured for him a considerable share of popularity, when he was overtaken by a fearful calamity, the loss of his reason — a condition in which, with a few lucid intervals, he remained to the end of his days. The origin of this was constitutional, aggravated by a fright and a severe accident. Perhaps at no period in her history was France the scene of greater disasters and miseries than during the reign of this unhappy prince. The rival factions of the Burgundians and the Armagnacs, kept up constantly throughout the country the horrors of a most rancorous civil war; while brigandage and every kind of violence prevailed to the most fearful extent. Such a conjunction afforded the most favorable opportunity for an invader; and accordingly, in 1415, Henry V. of England crossed over to Normandy with a numerous army, took Harfleur by storm, and signally defeated the French forces in the battle of Agincourt. Improving these advantages he advanced into the country, gained possession of the capital, and compelled the crazy king to sign the Treaty of Troyes, by which his daughter Catharine was given in marriage to Henry, and the latter acknowledged successor to the French crown after Charles' death. Neither monarch long survived this celebrated paction, both dying within a few months of each other.

Charles VII., king of France, 5th son of Charles VI.: b. Paris 22 Feb. 1403; d. Mehun 22 July 1461. He became, by the successive deaths of his elder brothers, dauphin and heir-presumptive to the crown. On the king of England's death in 1422 his son Henry VI. was proclaimed king of France at Paris. The war with the national party, represented by the Orleanist faction, with the dauphin at their head, was maintained for several years by the English, under the command of the Duke of Bedford. So successfully did the latter conduct operations that Charles was brought to the verge of despair, and almost reduced to abandon the struggle as hopeless, when his fortunes were retrieved by the arrival in his camp of the Maid of Orleans, who by the enthusiasm which she inspired first turned the tide of success against the English. (See JOAN OF ARC.) The fresh spirit thus infused into the breasts of the French was heightened by mismanagement on the part of the English, whose military operations were conducted with greatly diminished efficiency after the death of the Duke of Bedford, while discord and confusion prevailed in the home councils. Through the intervention of the Earl of Suffolk a marriage was concluded between the young king Henry VI. and Margaret of Anjou, niece of Charles VII.'s queen. In the treaty entered into on this occasion the territory of Maine was secretly surrendered to France, and subsequently, on hostilities being resumed between the two countries, the troops of Charles conquered the whole of Guienne, and finally expelled the English from all their possessions in France except Calais. The last years of Charles' reign were embittered by domestic broils, in which his son and successor Louis XI. took a prominent part against his father. So hemmed in at last was the latter by the emissaries of the dauphin that he conceived the idea of Louis having formed a deliberate plan to poison him; and so firmly was this notion rooted in his mind that he could only with the greatest difficulty be induced to take any food. A romantic interest has been thrown around Charles VII. by his early reverses and the re-establishment of French nationality, which he effected mainly through the heroism inspired by the Maid of Orleans. His personal character, however, was weak and contemptible, without energy and without principle, surrendering himself continually to sensual and degrading pleasures. His share in the treacherous murder of the Duke of Burgundy, and base abandonment to her fate of Joan of Arc, are stains on his memory which cannot be effaced.

Charles VIII., king of France, son of Louis XI.: b. Amboise 30 June 1470; d. there 7 April 1498. He succeeded his father in 1483, his sister Anne de Beaujeu acting as regent till he attained the age of 20. In 1491 he mar-

ried Anne, the heiress of Brittany, and thereby annexed that important duchy to the French crown. By so doing, however, he both broke faith with the daughter of Maximilian, king of the Romans, to whom he had been espoused, and also robbed Maximilian of his bride, a marriage by proxy having been already concluded between him and Anne. The leading incident of Charles VIII.'s reign is his Italian expedition and conquest of the kingdom of Naples, having been instigated thereto by Ludovico Sforza, the usurping Duke of Milan. The title pretended to Naples was asserted in virtue of the rights to that sovereignty transmitted by the house of Anjou to the royal family of France. The whole of Charles' expedition reads like a page from one of the old chivalrous romances. With an army of 30,000 men, unprovided either with money or stores, he suddenly crossed the Alps, advanced rapidly southward, and meeting with scarcely any obstruction, arrived before the walls and gained possession of Naples. This conquest, however, he did not retain for many months. Having left 5,000 men to guard his new acquisition he returned to France, and had scarcely reached it when the arms of Gonsalvo de Cordova effected the re-annexation of Naples to Spain. The expedition of Charles VIII. left thus hardly a trace upon the country, but is memorable as the commencement of that series of French incursions into Italy which, under his successors deluged that fair land with bloodshed. He left no children, and was succeeded by his relative, the Duke of Orleans, under the title of Louis XII.

Charles IX., king of France, son of Henry II. and Catharine de Medici: b. St. Germain-en-Laye 27 June 1550; d. 30 May 1574. He ascended the throne at the age of 10, after the death of his brother, Francis II. No regency was appointed, and it was deemed sufficient to write to the Parliament, through the young prince, that he had requested his mother to undertake the administration of the public affairs. The Parliament acquiesced in this resolution, to avoid exciting new contests between the Guises and the princes of the blood. The Duke of Guise, who obtained possession of the person of the young king, was shot by an assassin before Orleans, in February 1563. In his last moments he advised the king and the queen mother to negotiate with the parties. This advice was followed; a treaty was signed 19 March and Havre taken from the English 27 July. The king, who was the same year declared of age, visited the provinces in company with his mother. At Bayonne he had a meeting with his sister Isabella, the wife of Philip II. of Spain. This excited such suspicions in the Calvinists that they took up arms, and immediately formed the plan of attacking the king on his return to Paris. Being warned in season he escaped the danger; but this plot could not fail to arouse the hatred of Charles. After the battle of St. Denis, 1567, in which the constable of Montmorenci lost his life, Catharine entered into negotiations for peace. But the Calvinists reserved a part of the places which they were to have surrendered, and continued to keep up a communication with England and the German princes. A new civil war soon broke out. Notwithstanding the jealousy of Charles, Catharine placed the Duke of Anjou at the head of the royal army. The Prince of Condé having been shot in the battle of Jarnac in 1569, and the Admiral Coligny having been defeated at Montcontour in the same year, the king concluded peace, in 1570, on terms so favorable to the Calvinists that they seem even to have suspected treachery under them. The heads of that party did not therefore all appear at court when Charles celebrated his marriage with Elizabeth, the daughter of Maximilian II. By degrees this distrust disappeared, and the marriage of the young king of Navarre (afterward Henry IV.) with Margaret, sister of Charles X., seemed to banish every suspicion. This marriage took place 18 Aug. 1572. On the 22d the first attempt was made on the life of Coligny, and on the 24th began that massacre known under the name of the massacre of St. Bartholomew, from having taken place on the night of the festival of that saint. Civil war broke out for the fourth time, and Catharine now became aware of the errors of her policy. Charles could no longer conceal his aversion to her, and was on the point of assuming himself the reins of government, when he died, childless, in 1574.

Charles X., Comte d'Artois, king of France: b. Versailles 9 Oct. 1757; d. Goritz, Austria, 6 Nov. 1836; grandson of Louis XV. He was the youngest son of the dauphin, and brother of Louis XVI. He spent a dissipated youth, and left France in 1789, after the first popular insurrection and destruction of the Bastile, and at Pilnitz attended the Congress of Princes, for the purpose of opposing the spread of revolutionary principles. After Louis XVI. had accepted the Constitution of 1791, he invited Charles to return to France, but he refused, and the legislative assembly, after stopping his allowance on the civil list, confiscated his property in 1792. He afterward assumed the command of a body of emigrants, and acted in concert with the Austrian and Prussian armies on the Rhine. At a later period he made a descent on the coast of Brittany, but despairing of success, retreated to Great Britain, and resided for several years in the palace of Holyrood at Edinburgh. After the downfall of Napoleon he entered France with the title of lieutenant-general of the kingdom, and issued a judicious proclamation, promising the reign of law and an entire oblivion of the past. In 1824 he succeeded his brother, Louis XVIII., under the title of Charles X., and gained a momentary popularity by the abolition of the censorship of the press, but measures of a very different description soon followed, and the spirit of disaffection was so widely spread that a collision with the popular party became inevitable. Charles X. endeavored to gain the start by what is called a *coup d'état*, and issued his celebrated ordonnances, but victory declared against him, and he was ignominously driven from the throne in 1830. After formally abdicating in favor of his grandson, the Duke de Bordeaux, he revisited England, resumed his residence for a short time at Holyrood, and finally settled at Göritz in Styria. See Lorieux, 'Histoire de Règne de Charles X.' (1834).

Charles I., king of Germany. See Charles the Great.

Charles II., king of Germany. See Charles I. of France.

Charles III., surnamed LE GROS, king of Germany. See CHARLES II. of France.

Charles IV., emperor of Germany, of the house of Luxemburg: b. Prague 14 May 1316; d. there 29 Nov. 1378. He inherited the kingdom of Bohemia, and had been chosen emperor in 1346 by five electors, hoping to occupy the imperial throne without opposition. But the princes of the empire regarded him as a servant of the Pope. He however used every effort to appease his enemies, married the daughter of the Elector of the Palatinate, gave Tyrol as a fief to the Elector of Brandenburg, and was unanimously elected emperor, and consecrated at Aix-la-Chapelle. But no sooner was he crowned than he took possession of the imperial insignia, and conveyed them to Bohemia. In 1354 the emperor went to Italy to be crowned by the Pope; but this favor he purchased on terms which made him an object of ridicule and contempt. He engaged to appear without any armed force. Having been consecrated king of Italy at Milan, he confirmed the Visconti in the possession of all the usurpations of which he had promised to deprive them. He also annulled all the acts of his grandfather, Henry VII., against Florence, and by a treaty concluded at Padua resigned the latter city, with Verona and Vicenza, to Venice. He refused the request of some Romans to claim the city, as belonging to him in the name of the empire, and in a treaty renounced all sovereignty over Rome, the states of the Church, Ferrara, Naples, Sicily, Sardinia, and Corsica, and even took an oath not to return to Italy without the consent of the Pope. Despised by the Guelphs, detested by the Ghibellines, Charles returned to Germany, where he issued the celebrated golden bull, which, till modern times, continued a fundamental law of the German empire. He thus acquired some claims to the public gratitude, but these were soon effaced by the general indignation, excited by the proposal made, with his consent by the papal nuncio, to introduce a tax, equal to the tithe of all ecclesiastical revenues, for the benefit of the holy see. All the members of the diet opposed it; and Charles, in his anxiety to conciliate the princes of the empire, announced that he would propose to the Assembly a reform of the German clergy. The Pope, opposing this proposal of the emperor, exhorted the electors to depose him. Charles immediately relapsed into his accustomed submissiveness, and not only abandoned all his reforms, but even confirmed, in 1359, all the privileges of the clergy, all their present and future possessions, and made them independent of the secular power. Such vacillating conduct subjected him to the contempt of both parties. Under such an emperor Germany could not enjoy internal tranquillity. Bands of robbers plundered the country in all quarters. The emperor left the princes and cities to protect themselves by mutual alliances. The state of Italy was no less melancholy. Tuscany was suffering the evils of anarchy; Lombardy was distracted by civil wars, and the Visconti had made themselves masters of the Milanese. During his residence in Italy, he sold states and cities to the highest bidder, or, if they themselves offered most, made them independent republics. With great treasures he returned to Germany. Gregory XI. having given his consent that his son Wenceslaus should be elected king of the Romans, he employed his ill-gotten wealth to purchase the votes of the electors, who were irritated at the conduct of the Pope, and, moreover, distributed among them the domains of the empire on the Rhine, and several free imperial cities. Thus he attained his object. To maintain their rights against the arbitrary measures of the emperor, the imperial cities in Suabia formed the Suabian league, which Charles opposed in vain. His reign is notable for the improvement and prosperity of Bohemia; for the founding of the universities of Prague and Vienna; for a terrible persecution of the Jews, and as the period when the sale of letters of nobility commenced in Germany.

Charles V., emperor of Germany and king of Spain (in the latter capacity he is called Charles I.): b. Ghent 24 Feb. 1500; d. Yuste, Spain, 21 Sept. 1558. He was educated in the Netherlands under the care of William of Croy, lord of Chièvres, who taught him history, formed him for affairs of state, and gave him that gravity of manner which he retained through life. After the death of Ferdinand of Spain, his grandfather, in 1516, Charles assumed the title of king of Spain. The management of this kingdom was intrusted to the celebrated Cardinal Ximenes. In 1519 Charles, on the death of Maximilian, was elected emperor. He left Spain to take possession of his new dignity, for which he had to contend with Francis I., king of France. His coronation took place at Aix-la-Chapelle with extraordinary splendor. The progress of the Reformation in Germany demanded the care of the new emperor, who held a diet at Worms. Luther, who appeared at this diet with a safe conduct from Charles, defended his cause with energy and boldness. The emperor kept silent; but after Luther's departure a severe edict appeared against him in the name of Charles, who thought it his interest to declare himself the defender of the Roman Catholic Church.

In a very few years the power of Charles became a source of uneasiness to most other princes of Europe. Pope Clement VII. placed himself at the head of a league of the principal states of Italy against the emperor, but their ill-directed efforts were productive of new misfortunes. Rome was taken by storm by the troops of the constable of Bourbon, sacked, and the Pope himself made prisoner. Charles V. publicly disavowed the proceedings of the constable, went into mourning with his court, and carried his hypocrisy so far as to order prayers for the deliverance of the Pope. Henry VIII. of England now allied himself with the French monarch against Charles, who accused Francis of having broken his word. The war was terminated in 1529 by the Treaty of Cambray, of which the conditions were favorable to the emperor. Charles soon after left Spain, and was crowned in Bologna as king of Lombardy and Roman emperor. In 1530 he seemed desirous, at the Diet of Augsburg, to reconcile the various parties; but not succeeding, issued a decree against the Protestants, which they met by the Schmalkaldic League. Notwithstanding his undertakings in favor of the Roman Catholic religion, Charles always practised moderation toward the Protestants whenever his interest left room for toleration. Nor did the Protestant

princes hesitate to furnish their contingents when he was assembling an army against the Turks. Having compelled Solyman to retreat, he undertook in 1535 an expedition against Tunis, reinstated the dey, and released 20,000 Christian slaves. This success added to his character somewhat of the chivalric, which gave him still more influence in Christendom, and promoted his political projects.

The policy of Charles was to reconcile the two great religious parties, and with this view he alternately threatened and courted the Protestants. After some show of negotiation the Protestant princes raised the standard of war. The emperor declared, in 1546, the heads of the league under the ban of the empire, excited divisions among the confederates, collected an army in haste, and obtained several advantages over his enemies. John Frederick, the elector of Saxony, was taken prisoner in the battle of Mühlberg in 1547. Charles received him sternly, and gave him over to a court-martial consisting of Italians and Spaniards, under the presidency of Alva, which condemned him to death. The elector saved his life only by renouncing his electorate and his hereditary estates, but remained a prisoner. Meanwhile the emperor appeared somewhat more moderately inclined toward the vanquished party. On coming to Wittenberg he expressed surprise that the exercise of the Lutheran worship had been discontinued. He visited the grave of Luther, and said, "I do not war with the dead; let him rest in peace; he is already before his Judge." The Landgrave of Hesse-Cassel, one of the heads of the Protestants, was compelled to sue for mercy. Notwithstanding his promise Charles deprived him of his freedom. After having dissolved the League of Schmalkalden the emperor again occupied himself with the plan of uniting all religious parties, and for this purpose issued the Interim, which was as fruitless as the measures proposed by him at the Diet of Augsburg. Neither was he successful in securing the imperial crown to his son. Discord still agitated public sentiment, and a new war broke out against him. Maurice of Saxony, whom he had invested with the electoral dignity, formed a league, which was joined by Henry II., king of France, the successor of Francis. The preparations had been made with the greatest secrecy. Charles was at Innsbruck superintending the deliberations of the Council of Trent, and meditating great plans against France and Turkey. He was expecting the aid of Maurice when this prince threw off the mask, appeared suddenly at the head of an army, and invaded the Tyrol in 1552 while Henry II. entered Lorraine. Charles was very nearly surprised in Innsbruck. Maurice abandoned the imperial castle to plunder, the Council of Trent was dissolved, and the Protestants dictated the conditions of the Treaty of Passau in 1552. Charles was not more successful in Lorraine. He was unable to recover Metz, defended by the Duke of Guise. In Italy he lost Sienna by a revolt. He withdrew to Brussels, where, hard pressed by his enemies, he became gloomy and dejected, and for several months concealed himself from the sight of every one, so that the report of his death was spread through Europe. His last exertions were directed against France, which constantly repelled his assaults. The Diet of Augsburg in 1555 confirmed the Treaty of Passau, and gave the Protestants equal rights with the Roman Catholics.

Charles, seeing all his plans frustrated and the number of his enemies increasing, resolved to transfer his hereditary states to his son Philip. Having convened the estates of the Low Countries at Louvain, in 1555, he explained to them the grounds of his resolution, asserted that he had sacrificed himself for the interests of religion and of his subjects, but that his strength was inadequate to further exertion, and that he should devote to God the remainder of his days. At that time Charles conferred on Philip the sovereignty of the Netherlands alone. On 15 Jan. 1556 he conferred upon him, in like manner, the Spanish throne, reserving for himself merely a pension of 100,000 ducats. He selected for his residence the monastery of St. Justus, near Plasencia in Estremadura, and here he exchanged sovereignty, dominion, and pomp for the quiet and solitude of a cloister. His amusements were confined to short rides, to the cultivation of a garden, and to mechanical labors. It is said that he made wooden clocks, and being unable to make two clocks go exactly alike, was reminded of the folly of his efforts to bring a number of men to the same sentiments. He attended religious services twice every day, read books of devotion, and by degrees fell into such dejection that his faculties seemed almost impaired. He renounced the most innocent pleasures, and observed the rules of the monastic life in all their rigor.

Charles had a noble air and refined manners. He spoke little, and smiled seldom. Firm of purpose; slow to decide; prompt to execute; equally rich in resources and sagacious in the choice of them; gifted with a cool judgment, and always master of himself. Circumstances developed his genius and made him great. Although he did not scruple to break his promises, he imposed, by the semblance of magnanimity and sincerity, even on those who had already experienced his perfidy. An acute judge of men, he knew how to use them for his purposes. In misfortune he appears greater than in prosperity. He protected and encouraged the arts and sciences, and is said to have picked up a brush which had fallen from the hand of Titian with the words, "Titian is worthy of being served by an emperor." By his wife Eleonora, daughter of Emanuel, king of Portugal, he had one son, afterward Philip II., and two daughters. He had also several natural children. No minister had a decided influence over him. He was indefatigable in business, weighing the reasons on both sides of every case with great minuteness. Wherever he was he imitated the customs of the country, and won the favor of every people except the Germans. Gachard, 'Correspondance de Charles Quint' (1859); Stirling Maxwell, 'Cloister Life of the Emperor Charles V.' (1852); Guntram, 'Kaiser Karl V.' (1865); Robertson, 'History of the Reign of Charles V.'

Charles VI., emperor of Germany, the second son of the Emperor Leopold I.: b. 1 Oct. 1685; d. 20 Oct. 1740. His father destined him for the Spanish throne. The last prince of the house of Hapsburg, Charles II., disregarding the house of Austria, whose right to the Spanish throne was undoubted, according to the

law of inheritance by descent, had by will made Philip, Duke of Anjou, second grandson of Louis XIV., heir of the Spanish monarchy. Accordingly, on the death of Charles II., 1 Nov. 1700, Philip took possession of the vacant kingdom. England and Holland united against him, and this alliance was soon joined by the German empire, Portugal, and Savoy. Charles was proclaimed king of Spain at Vienna, in 1703, and proceeded by way of Holland to England, from whence, in January 1704, he set sail with 12,000 men for Spain, which was almost wholly occupied by the French, and landed in Catalonia. He succeeded in making himself master of Barcelona; but was soon besieged there by his rival Philip V. At the head of a garrison of hardly 2,000 men, he made the most obstinate resistance, till the long-expected English fleet appeared, which compelled the French speedily to raise the siege. This event was followed by alternate reverses and successes. Twice Charles reached Madrid, and twice was he driven from the city. The first time, in 1706, he caused himself to be proclaimed king in the capital, under the name of Charles III. He had been a second time compelled to flee to the walls of Barcelona, when he was informed of the death of his brother Joseph I. According to the will of Leopold, this event placed the double crown of Charles V. on his head; to his claims on Spain it added the more certain possession of the Austrian dominions. But the allies did not like to see so much power united in the same hands. Charles returned to Germany, and on his arrival learned that, at Eugene's suggestion, he had also been elected emperor. His coronation took place at Frankfort, in December 1711; and in the following year he received, at Presburg, the crown of Hungary. At the same time he still retained the empty title of king of Spain. He now prosecuted, under the conduct of Eugene, the Spanish war of succession; the allies concluded a peace with France at Utrecht in 1713, in spite of all the efforts of the emperor to prevent it. He was obliged, in the following year, to sign the Treaty of Rastadt. This treaty secured him in the possession of Milan, Mantua, Sardinia, and the Netherlands. To secure his dominions to his daughter, Maria Theresa, in default of male heirs, Charles strove to induce the powers to guarantee the pragmatic sanction, which settled the succession in her favor. He succeeded in gaining the concurrence of all the European powers. The reign of this prince was marked with perpetual agitations. The succession to the Polish throne, after the death of Augustus II., in 1733, disturbed the peace of Europe. Charles, with Russia, supported the son of this prince; but France and Spain declared themselves for Stanislaus Leczinsky. From this arose a war, which terminated, in 1735, in the loss of the Two Sicilies, and a part of the duchy of Milan. Austria received Tuscany in exchange for Lorraine, and obtained Parma. Hardly had Charles finished this war, when his alliance with Russia involved him anew in a war with the Turks. In 1737 his troops invaded Servia, without any declaration of war. and occupied Nissa. But the Turks renewed their attacks with a continually augmented force, and obliged the emperor, after three unsuccessful campaigns, to cede to them by the Peace of Belgrade, in 1739, Walachia and the Austrian part of Servia, with Belgrade.

Charles VII. (properly CHARLES ALBERT), emperor of Germany: b. Brussels 6 Aug. 1697; d. Munich 20 Jan. 1745. He was the son of Maximilian Emanuel, elector of Bavaria, then governor of the Spanish Netherlands. His youth was spent at the imperial court, and in the war against the Turks he commanded the army of auxiliaries sent by his father. In 1722 he married the daughter of Joseph I., having previously renounced all rights which this marriage might give him to the succession to the throne of Austria. In 1726 he succeeded his father as Elector of Bavaria. He was one of the princes who protested against the pragmatic sanction, guaranteed in 1732 by the Diet of Ratisbon, and in consequence concluded a defensive alliance with Saxony. After the death of Charles VI., in 1740, he refused to acknowledge Maria Theresa as his heiress, founding his own claims to the succession on a testament of Ferdinand I. He was supported by the king of France with a considerable force. In 1741 he was recognized at Lintz as Archduke of Austria. The obstacles thrown in his way by Cardinal Fleury, who wished not to dismember the Austrian monarchy, as well as the want of artillery and ammunition, prevented him from getting possession of Vienna. On the other hand he took Prague, where he was crowned and proclaimed king of Bohemia. In 1742 he was unanimously elected king of the Romans: he made a solemn entry into Frankfort, and was crowned by his brother, the Elector of Cologne. But fortune soon deserted him. The armies of Maria Theresa reconquered all Upper Austria, and overwhelmed Bavaria. It was necessary to abandon Bohemia. Charles fled to Frankfort, and convoked a diet, when an attack of the king of Prussia on Maria Theresa allowed him to return to Munich in 1744. He was succeeded in the electorate by his son Maximilian Joseph, in the imperial dignity by Francis I., husband of Maria Theresa.

Charles I. of Anjou, king of Naples, the son of Louis VIII. of France: b. about 1220; d. Foggia 7 Jan. 1282. He waged war on King Manfred of Sicily, and having defeated him, seized on the Neapolitan crown in 1266. His cruelty and exacting rule induced such a detestation of the French name, that the Sicilians, headed by John de Procida, rose in arms on the eve before Easter Day, 1282, and slaughtered all the French in the town and neighborhood of Palermo, the signal for rising being the tolling of the vesper-bell; this tragedy is hence recorded in history as the «Sicilian Vespers» (q.v.). By this act the French were entirely expelled from the island.

Charles I., king of Portugal: b. 28 Sept. 1863. He is the son of Luiz I. and of Maria, the daughter of Victor Emmanuel II. of Italy, and came to the throne 19 Oct. 1889. Since that event a powerful radical element has made itself felt in Portugal. The country has, however, become of more importance than for some time previous owing to the progress that Portuguese colonization has lately been making in east Africa.

Charles I., Karl Eitel Friedrich Zephym Ludwig (of HOHENZOLLERN SIGMARINGEN), king of Rumania: b. Germany 20 April 1839. The second son of Prince Karl of Hohenzollern, he entered the Prussian army early and held the

rank of lieutenant of dragoons when, at the suggestion of the Prussian ambassador, he was elected Prince of Rumania 10 May 1866. He subsequently proclaimed Rumania independent of Turkey and was declared king 26 March 1881. He was married in 1869 to Princess Elizabeth von Neuwied, who as «Carmen Sylva» (q.v.) is well known as an author.

Charles Albert, king of Sardinia: b. 2 Oct. 1798; d. Oporto, Portugal, 28 July 1849. He was the son of Charles Emmanuel, prince of Savoy-Carignan. He was educated in France, and in 1831 succeeded to the throne as the nearest heir on the death of Charles Felix, and in the first years of his reign showed himself favorable to the cause of progress by promoting a number of beneficial reforms. Subsequently, indeed, he became more absolute in his views, but after the French revolution of February 1848 he granted the nation a constitution, and took the field against Austria on behalf of the revolted peoples of the Lombardo-Venetian kingdom and the duchies of central Italy. His arms were at first very successful, defeating the Austrians in various encounters, but he was at last repulsed by Marshal Radetzky, and obliged to apply for an armistice. On its expiration he resumed hostilities, but only to endure reverses. The battle of Novara, fought on 23 March 1849, proved fatal to the aspirations of Charles Albert and Sardinia. That very day he abdicated in favor of his son, Victor Emmanuel II., afterward king of Italy, and retired to Oporto, in Portugal.

Charles I., king of Spain. See CHARLES V., emperor of Germany.

Charles II., king of Spain: b. 6 Nov. 1661; d. 1 Nov. 1700. He succeeded his father, Philip IV., in 1665. In this reign, Spain, which for nearly three centuries had held the foremost rank in Europe as a great military nation, reached the highest point of its greatness, and began rapidly to decline both in influence and glory, but such was the prestige attached to its name and past history, that it had long become powerless before it ceased to be respected. Charles died in 1700, bequeathing his throne to the Duke d'Anjou, grandson of Louis XIV. of France, an act which led to the long and calamitous «War of the Spanish Succession.»

Charles IV., king of Spain: b. Naples 12 Nov. 1748; d. there 19 Jan. 1819. He came to Madrid in 1759, when his father, Charles III., after the death of his brother, Ferdinand VI., ascended the Spanish throne, and succeeded him, 13 Dec. 1788. He was married to the Princess of Parma, Louisa Maria. Too imbecile to govern, he was always ruled by his wife and his ministers, among whom the Prince of Peace, Godoy, Duke of Alcudia, from the year 1792, had unbounded influence over him. The hatred which this favorite drew on himself from the Prince of Austrias and other grandees brought on a revolution in 1808, which enabled Napoleon to dethrone the Bourbons. Charles abdicated at Aranjuez, 19 March, revoked this abdication, and finally ceded, at Bayonne, his right to the throne of Napoleon, who settled on him for life the palace of Compiègne and a pension of 6,000,000 francs. Charles after this lived at Compiègne with the queen and her paramour the Prince of Peace, but subsequently exchanged this residence for Rome, where the climate was more congenial to him. From 1815 he occupied the palace Barberini in this city. Hunting he always made his principal employment.

Charles IX., king of Sweden: b. 5 Oct. 1550; d. Nyköping 30 Oct. 1611. He was the fourth son of Gustavus Vasa and was chosen king in 1604. He fostered trade and mining, and established the University of Gothenburg, at the same time that he was subduing the turbulent nobles of the realm and forming alliances with the Protestant princes of Pennany.

Charles X., king of Sweden: b. Nyköping 8 Nov. 1622; d. Gothenburg 13 Feb. 1660. He succeeded his cousin, Christina, in 1654, and by his prudence and valor considerably extended his dominions, wresting Livonia from the Poles, and several provinces from the crown of Denmark. After a short reign of six years, in which he was constantly engaged in war, sometimes meeting with severe reverses, but, on the whole, a considerable gainer, he was fatally attacked with an epidemic disease then raging among his troops, and was succeeded by his son Charles.

Charles XI., king of Sweden: b. 25 Dec. 1655; d. Stockholm 15 April 1697. He succeeded to the throne at five years of age, but the country was governed by a regency till 1672. He then put in force a system of tyrannous exaction and arbitrary oppression, by which he in a short time made himself absolute. Having once become independent of the states, he studied to appease the people by ruling with justice and impartiality. In war he was unsuccessful, and lost much of his father's territorial acquisitions. He founded the University of Lund, reorganized the army and navy and strengthened the fortresses of the country.

Charles XII., king of Sweden: b. Stockholm 27 June 1682; d. Frederikshall, 30 Nov. 1718. He was well instructed in the languages, history, geography, and mathematics. Curtius' 'History of Alexander' was his favorite book. On the death of his father, in 1697, he was declared of age by the estates. Meanwhile the young king showed but little inclination for business: he loved violent bodily exercises, and especially the chase of the bear. To his jealous neighbors this seemed a favorable time to humble the pride of Sweden. Frederick IV. of Denmark, Augustus II. of Poland, and the Czar Peter I. of Russia therefore concluded an alliance which resulted in the northern war. The Danish troops first invaded the territory of the Duke of Holstein-Gottorp. Charles proposed in the Council of State the most energetic measures against Denmark, the result of which was the discomfiture of the Danes, while the Duke of Holstein was confirmed in all the rights of which it had been attempted to deprive him. Thus ended the first enterprise of Charles XII., in which he exhibited as much intelligence and courage as disinterestedness. He adopted at this time that severe and temperate mode of life to which he ever remained true, avoiding relaxation and useless amusements; wine was banished from his table; at times coarse bread was his only food; he often slept in his cloak on the ground; he generally wore a blue coat, with copper buttons, large boots reaching above his knees, and gloves of buffalo skin.

After thus checking Denmark the attacks of Augustus and Peter were to be repelled. The

former was besieging Riga, the latter menaced Narva and the country situated about the Gulf of Finland. Without returning to his capital, which in fact he never revisited, Charles caused 20,000 men to be transported to Livonia, and went to meet the Russians, whom he found 80,000 strong in a fortified camp under the walls of Narva. On 30 Nov. 1700, between 8,000 and 10,000 Swedes placed themselves in order of battle, under the fire of the Russians, and the engagement began. In less than a quarter of an hour the Russian camp was taken by storm. Thirty thousand Russians perished on the field or threw themselves into the Narva; the rest were taken prisoners or dispersed. After this victory Charles crossed the Dwina, attacked the intrenchments of the Saxons, and gained a decisive victory.

The war continued: the Swedes gained a brilliant victory at Clissau; in 1703 all Poland was in the possession of the conquerors. At Altranstadt he dictated the conditions of peace in 1706. The Livonian Patkul, who was the prime mover of the alliance against Sweden (at that time Peter's ambassador in Dresden), was delivered up to him on his demand, and was broken on the wheel. It might well cause general astonishment that a prince, till then so magnanimous, could stoop to such intemperate revenge. In other respects Charles exhibited, during his stay in Saxony, moderation and magnanimity.

In September 1707 the Swedes left Saxony. They were 43,000 strong, well clothed, well disciplined, and enriched by the contributions imposed on the conquered. Six thousand men remained for the protection of the king of Poland; with the rest of the army Charles took the shortest route to Moscow. But having reached the region of Smolensk he altered his plan, at the suggestion of the Cossack hetman Mazeppa, and proceeded to the Ukraine, in the hope that the Cossacks would join him. But Peter laid waste their country, and the proscribed Mazeppa could not procure the promised aid. The difficult marches, the want of provisions, the perpetual attacks of the enemy, and the severe cold, weakened Charles' army in an uncommon degree. Pultawa, abundantly furnished with stores, was about to be invested when Peter appeared with 70,000 men. Charles, in reconnoitering, was dangerously wounded in the thigh; consequently, in the battle of 8 July 1709, which changed the fortunes of the Swedish hero and the fate of the North, he was obliged to issue his commands from a litter, without being able to encourage his soldiers by his presence. They were obliged to yield to superior force, and the enemy obtained a complete victory. Charles saw his generals, his favorite minister, Count Piper, and the flower of his army, fall into the power of those Russians so easily vanquished at Narva. He himself, together with Mazeppa, fled with a small guard, and was obliged, notwithstanding the pain of his wounds, to go several miles on foot. He finally found refuge and an honorable reception at Bender, in the Turkish territory. The regency in Stockholm took measures for the defense of the Swedish territory. Gen. Steinbock assembled a body of militia and peasants, defeated the Danes at Helsingborg, and compelled them to evacuate Schonen. Several divisions were sent to Finland to keep off the Russians, who nevertheless advanced, being superior in numbers. Charles, meanwhile, negotiated at Bender with the Porte; succeeded in removing the ministers who were opposed to him, and induced the Turks to declare war against Russia. The armies met on the banks of the river Pruth, 1 July 1711. Peter seemed nearly ruined when the courage and prudence of his wife produced a peace, in which the interests of Charles were entirely neglected. This monarch, however, projected at Bender new plans, and through his agents solicited of the Porte auxiliaries against his enemies. But the Russian agents were no less active to prepossess the Porte against him, pretending that Charles designed to make himself, in the person of Stanislaus, the actual master of Poland, in order from thence, in connection with the German emperor, to attack the Turks. The seraskier of Bender was ordered to compel the king to depart, and in case he refused, to bring him, living or dead, to Adrianople. Little used to obey the will of another, and apprehensive of being given up to his enemies, Charles resolved to defy the forces of the Porte with the 200 or 300 men of which his retinue consisted, and, sword in hand, to await his fate. When his residence at Varnitza, near Bender, was attacked by the Turks he defended it against a whole army, and yielded only step by step. The house took fire, and he was about to abandon it when, his spurs becoming entangled, he fell and was taken prisoner. The Turks now removed their prisoner from Bender to Demotica, near Adrianople. Escaping in disguise he reached Stralsund on the night of 22 Nov. 1714. A combined army of Danes, Saxons, Russians, and Prussians immediately invested Stralsund. Charles performed, during the defense, miracles of bravery. But being obliged to surrender the fortress, on 23 Dec. 1715, he proceeded to Lund, in Schonen, and took measures to secure the coast. He then attacked Norway. The Baron of Görtz, whose bold but intelligent plans were adapted to the situation of the Swedish monarchy, was at that time his confidential friend. His advice was, that Charles should gain Peter the Great to the interest of Sweden by important concessions, make himself master of Norway, and from thence land in Scotland, in order to dethrone George I., who had declared himself against Charles. Görtz discovered resources for prosecuting the war, and entered into negotiations at Aland with the plenipotentiaries of the czar. Peter was already gained and a part of Norway conquered; the fortunes of Sweden seemed to assume a favorable aspect; Charles was besieging Frederikshall, when, on 30 Nov. 1718, as he was in the trenches, leaning against the parapet and examining the workmen, he was struck on the head by a cannon-ball. He was found dead in the same position, his hand on his sword, in his pocket the portrait of Gustavus Adolphus and a prayer-book.

At Charles' death Sweden sank from the rank of a leading power. In his last years he had formed great plans for the improvement of its navy, trade, and commerce. At Lund he often conversed with the professors of the university, and attended public disputations on geometry, mechanics, and history. In Bender, the reading of useful books was one of his principal employments: he sent for Swedish scholars, and caused them to travel through

Greece and Asia. Accounts of some of these travels have been printed; there are others in manuscript at Upsal. Firmness, valor, and love of justice were the grand features of Charles' character, but were disfigured by an obstinate rashness. After his return he showed himself more peaceable, gentle, moderate, and disposed to politic measures. Posterity, considering him in relation to his times, will say that he had great virtues and great faults; that he was seduced by prosperity, but not overcome by adversity.

Charles XII., The History of, a famous work by Voltaire, published in 1731. It is divided into eight books, and is considered its author's historical masterpiece.

Charles XIII., king of Sweden: b. 7 Oct. 1748; d. 5 Feb. 1818. He was the second son of King Adolphus Frederick. Having been appointed at his birth high-admiral of Sweden, his education was directed chiefly to the learning of naval tactics, for which purpose he engaged in several cruises in the Cattegat. In 1765 he became honorary president of the Society of Sciences at Upsal. In 1770 he commenced the tour of Europe. The death of Adolphus Frederick recalled him to Sweden, where he took an important part in the revolution of 1772. His brother, Gustavus III., appointed him governor-general of Stockholm, and Duke of Sudermannland. In the war with Russia, in 1788, he received the command of the fleet, defeated the Russians in the Gulf of Finland, and, in the most dangerous season of the year, brought back his fleet in safety to the harbor of Carlscrona, after which he was appointed governor-general of Finland. After the murder of Gustavus III., in 1792, he was placed at the head of the regency, and, happily for Sweden, preserved the country at peace with all other nations, while he united with Denmark for the protection of the navigation in the northern seas. In 1796 he resigned the government to Gustavus Adolphus IV., who had become of age, and retired to his castle of Rosersberg. He did not again appear in public life till a revolution hurled Gustavus Adolphus IV., in 1809, from the throne, and placed Charles at the head of the state, as administrator of the realm, and some months afterward, 20 June 1809, as king of Sweden, at a very critical period. The peace with Russia, at Frederiksham, 17 Sept. 1809, gave the country the tranquillity necessary for repairing its heavy losses, and for completing the constitution. He had already adopted Prince Christian of Holstein-Sonderburg-Augustenburg as his successor, and after his death, Marshal Bernadotte, who was elected by the estates, in August 1810, to take the place of the prince. On him he bestowed his entire confidence. His prudent conduct in the war between France and Russia in 1812 procured Sweden an indemnification for Finland by the acquisition of Norway 4 Nov. 1814. Although some disappointed nobles may have given utterance to murmurs against his government, Charles XIII. nevertheless enjoyed the love of his people till his death.

Charles XIV., king of Sweden. See BERNADOTTE, JEAN BAPTISTE JULES.

Charles XV. (LOUIS EUGÈNE), king of Sweden and Norway: b. 3 May 1826; d. 18 Sept. 1872. He was the son of Oscar I., whom he succeeded 8 July 1859. In his reign the Storthing, or parliament, was reconstituted and given a more representative character. He was the author of a book of poems.

Charles, archduke of Austria, third son of the Emperor Leopold II.: b. Florence 5 Sept. 1771; d. 30 April 1847. In his 20th year he distinguished himself in the battles of Jemappes and Neerwinden, in both of which the French republican armies were beaten, and was appointed governor-general of Belgium in 1793. Appointed in 1796 field-marshal of the empire and commander-in-chief of the Austrian army on the Rhine, he opened the campaign by the victory of Neumarkt over Jourdan, which were quickly followed by the successes of Teining and Amberg, which compelled Moreau to make his memorable retreat. In the winter of 1797 he captured Kehl, the only position the French occupied in Germany. After the fruitless congress at Rastadt he put himself at the head of the Rhine army, and again defeated his old opponent Jourdan at Ostrach and Stockach. Misunderstandings that arose between him and the Russian generals, Suwarow and Korsakow, and his weak state of health, compelled him to throw up his command and retire to Bohemia. In the protracted struggle in the heart of Germany Napoleon's genius was on every occasion triumphant, once only, at Aspern, did Charles snatch a victory from him, but the battle of Wagram laid Austria at the feet of the French emperor.

Charles, 1st Duke of Lorraine: b. 953; d. Orleans 994. He early succeeded to his paternal inheritance. No sooner, however, was he invested with sovereign power, than he laid claim to the crown of France, on the death of Louis V., and immediately endeavored to sustain his claim by force of arms; but in the first battle fought between the two powers, was made prisoner, his army entirely defeated, and himself cast into a dungeon in the gloomy castle of Orleans, where he died a prisoner, 994.

Charles Augustus, Grand Duke of Saxe-Weimar: b. 3 Sept. 1757; d. Graditz, Prussia, 14 June 1828. He succeeded to power in 1775, was a general in the army of Prussia 1772–93, and with the allies opposed Napoleon 1813–15. By the Congress of Vienna his principality was made a grand duchy. He liberally patronized science and art, and under him his capital of Weimar became the literary centre of Germany. He was a close friend of Goethe.

Charles the Bald. See CHARLES I. of France.

Charles the Bold, Duke of Burgundy: b. Dijon 10 Nov. 1433; d. Nancy 5 Jan. 1477. He succeeded to the dukedom in 1467, and immediately engaged in a war with the citizens of Liége, whom he conquered and treated with extreme severity. Before this undertaking he had been obliged to restore to the citizens of Ghent the privileges which had been taken from them by Philip the Good. He now revoked his forced concessions, caused the leaders of the insurrection to be executed, and imposed a large fine on the city. In 1468 he married Margaret of York, sister of the king of England. Learning that the inhabitants of Liége, instigated by the king, Louis XI., had rebelled anew, and made themselves masters of Tongres, he compelled the king to sign a treaty, the most disgraceful condition

of which was that he should march with Charles against the city of Liége, which he had himself excited against the Duke. Charles encamped before Liége in company with the king; the city was taken by storm, and abandoned to the fury of the soldiers. Such success rendered the mind of the Duke utterly obdurate, and added the last traits of that inflexible sanguinary character which made him the scourge of his neighborhood, and led to his own destruction. Edward IV. conferred on him in 1470 the Order of the Garter. Shortly after he received in Flanders Edward himself, who came to seek an asylum with the Duke. Charles gave him money and ships to return to England.

About the end of the same year the war between the king of France and the Duke of Burgundy was renewed, and never did Charles show himself more deserving of the name of the "Bold" or "Rash," than in this war.

Having completed the conquest of Lorraine by the taking of Nancy in 1475, he turned his arms against the Swiss; and notwithstanding the representations of these peaceful mountaineers, who told him that all that he could find among them would not be worth so much as the spurs of his horsemen, he took the city of Granson, and put to the sword 800 men, by whom it was defended. But these cruelties were soon avenged by the signal victory which the Swiss obtained near the same city 3 March 1476.

With a new army he returned to Switzerland, and lost the battle of Murten (Morat) 22 June. The Duke of Lorraine, who had fought in the army of the Swiss, led the victors to the walls of Nancy, which surrendered 6 October. At the first information of this siege Charles marched to Lorraine, to retake the city of Nancy from the Duke René. On 5 or 6 January 1477 the two armies met: the wings of the Burgundian army were broken through and dispersed, and the centre, commanded by the Duke in person, was attacked in front and flank. As Charles was putting on his helmet, the gilded lion which formed its crest fell to the ground, and he exclaimed with surprise, *Ecce magnum signum Dei!* Defeated, and carried along with the current of fugitives, he fell, with his horse, into a ditch, where he was killed by the thrust of a lance. His body, covered with blood and mire, and with the head imbedded in the ice, was not found till two days after the battle, when it was so disfigured that for some time his own brothers did not recognize it. See Kirk, 'History of Charles the Bold' (1863–8). In 'Quentin Durward,' Sir Walter Scott has portrayed the character of Charles, and some of the quarrels between him and Louis of France.

Charles Edward Stuart (The Young Pretender), grandson of James II., king of England: b. Rome 31 Dec. 1720; d. there 31 Jan. 1788. From the cradle he was inspired with an impulse that induced him to attempt the recovery of the throne of his ancestors. With borrowed money, and seven trusty officers, he landed, 28 July 1745, at Lochnanuadh, Scotland, from a ship of 18 guns called the Doutelle, which contained arms for 1,500 men. He found so many adherents among the discontented Scottish nobles, who went over to his party together with the Highlanders under them, that he was soon at the head of a little army. With this he conquered the British troops which advanced to meet him from Edinburgh, captured Perth, and caused himself to be proclaimed regent of England, Scotland, and Ireland. He also took Edinburgh, 17 Sept. 1745, where he was once more proclaimed regent, and surrounded with his ministers and generals. On 22 Sept. 1745 he defeated at Prestonpans an army of 4,000 British under Sir John Cope. He set the prisoners at liberty. His force was now 7,000 strong. With this he advanced, and laid siege to Carlisle, 15 November, which, after three days, surrendered and supplied him with a great number of arms.

He now caused his father to be proclaimed king, and himself regent of England; removed his headquarters to Manchester, and soon found himself within 100 miles of London, where many of his friends awaited his arrival. The rapid successes of the adventurer made the British government tremble; and a part of the British forces in Germany was recalled. Want of support, disunion, and jealousy among his adherents of the house of Stuart, and the superior force opposed to him, compelled Prince Charles to retire in the beginning of 1746. The victory at Falkirk, 28 Jan. 1746, was his last. As a final attempt he risked the battle of Culloden, against the Duke of Cumberland, 16 April 1746, in which his army was defeated and entirely dispersed. The prince now wandered for a long time through the wilds of Scotland, often without food, and the price of £30,000 sterling was set on his head. Once, when fairly surrounded by enemies, he succeeded in escaping by the devotion and courage of Flora McDonald. On 20 Sept. 1746, five months after the defeat of Culloden, he sailed from Scotland, and arrived in France destitute of everything. By the interest of Madame de Pompadour Charles now received an annual pension of 200,000 livres for life; he had also 12,000 doubloons yearly from Spain.

The Peace of Aix-la-Chapelle in 1748 deprived him of all prospects of recovering the throne of Great Britain. He went to Rome, the residence of his father, James III.; but his relations to the Roman court were changed after his father's death 1 Jan. 1766. His often ridiculous requests in regard to the etiquette to be observed toward him, which he made under the name of Count of Albany, rendered his presence troublesome. He went to Florence till Pius VI. recalled him to Rome by withdrawing his pension. That his family might not become extinct, he married in the 52d year of his age, 17 April 1772, a princess of Stolberg-Gedern; but his violence led to a separation in 1780. He now became addicted to intoxication. He died 31 Jan. 1788, in the 68th year of his life. Three years before he sent for his natural daughter from France, legitimated her, and declared her, on his royal authority, his lawful heiress, under the title of Countess of Albany. His body was carried to Frascati, and entombed in a style worthy of a king. A sceptre, crown, sword, and the escutcheons of England and Scotland adorned his coffin; and his only brother then living, the Cardinal of York, performed the funeral services for "dead King Charles." The Cardinal of York received a pension from Great Britain after 1799, and died in Frascati 13 July 1807.

Charles Emmanuel I., Duke of Savoy, surnamed "the Great": b. Rivoli 12 Jan. 1562; d. Savillan 26 July 1630. He formed (1590) the plan

of uniting Provence to his dominions. Philip II. of Spain, his father-in-law, obliged the parliament of Aix to acknowledge him as the protector of this province, in order by this example to induce France to acknowledge the king of Spain as protector of the whole realm. The Duke of Savoy, not less ambitious, likewise aimed at this crown, and after the death of Matthias desired also to be chosen emperor of Germany. He likewise intended to conquer the kingdom of Cyprus, and to take possession of Macedonia, the inhabitants of which, oppressed by the Turks, offered him the sovereignty over their country. The citizens of Geneva were obliged to defend their city in 1602 against this ambitious prince, who fell upon them by night in time of peace. Henry IV., who had reason to complain of the Duke, and whose general, the Duke of Lesdiguieres, had beaten Charles Emmanuel several times, entered at last into a treaty of peace with him, not disadvantageous to the Duke of Savoy; but he could not remain quiet, and began again a war with France, Spain, and Germany.

Charles the Fair. See CHARLES IV. of France.

Charles the Fat. See CHARLES II. of France.

Charles Friedrich August Wilhelm, Duke of Brunswick: b. 30 Oct. 1804; d. 1873. He succeeded to the dukedom in 1823, but his rule was so arbitrary and oppressive that the German Diet deposed him. He subsequently lived in Paris and London, and at his death bequeathed his vast fortune to the city of Geneva.

Charles d'Orleans, shärl'dor-lā-än', French nobleman and poet, son of Louis d'Orléans: b. 26 May 1391; d. 4 Jan. 1465. He was the grandson of Charles V. of France, and the father of Louis XII. He was taken prisoner at Agincourt, and kept in captivity in England from 1415 to 1440, when he was ransomed. He wrote a number of lyrics while in prison and after his return to France. At Blois, where he held his court, he gathered together the chief French writers of his time, and took part with them in poetical tournaments, in one of which François Villon competed successfully. He has been termed the father of French lyric poetry, but has no claim to the title. His light and graceful lyrics are the last flowering of the courtly poetry of the Middle Ages; they show no trace of the modern spirit which appears so strongly in the works of his contemporary, Villon. His favorite themes are love and the springtime; his favorite form is the rondel, with two rhymes, of which he is considered the chief master, as Villon is of the ballade, and Voiture of the rondeau.

Charles the Simple. See CHARLES III. of France.

Charles the Wise. See CHARLES V. of France.

Charles, Elizabeth Rundle, English writer of religious stories: b. 1826; d. London 28 March 1896. She was married to Andrew Charles in 1851. Her books have been widely popular in England and America, the most famous of them being 'The Chronicles of the Schonberg-Cotta Family' (1863). Among her other works are: 'Diary of Miss Kittie Trevelyan' (1864); 'The Draytons and Davenants' (1866); 'Winifred Bertram' (1866); 'Martyrs of Spain' (1870); 'Against the Stream' (1873); 'The Bertram Family' (1876); 'Lapsed But Not Lost' (1881).

Charles, Jacques Alexander César, French scientist: b. Beaugency, France, 12 Nov. 1746; d. 7 April 1823. He lectured on physical science in Paris and in 1783 made with M. Robert the first ascent ever made in a balloon. A height of 7,000 feet was reached on this occasion.

Charles, R. H., Irish theologian and scholar: b. County Tyrone 6 Aug. 1855. He was educated at Queen's College, Belfast, and Trinity College, Dublin, and was admitted to the Anglican priesthood in 1883. He was curate of St. Mark's, Whitechapel, 1883–5; of St. Philip's, Kensington, 1885–6; and of St. Mark's, Kennington, 1886–9. Since 1898 he has been professor of biblical Greek at Trinity College, Dublin. He has published 'Forgiveness, and Other Sermons' (1886); 'Book of Enoch Translated From the Ethiopic' (1893); 'Ethiopic Text of Book of Jubilees' (1894); 'Book of the Secrets of Enoch' (1895); 'The Assumption of Moses' (1897), etc.

Charles Grandison, The History of, the title of an extremely prolix novel by Samuel Richardson, published in 1753.

Charles City, Iowa, a city and county-seat of Floyd County, on Cedar River, and on the Illinois Cent., and the Chicago, M. & St. P. R.R.'s. It is supplied with good water-power by the river and has a number of manufacturing interests. It is the seat of Charles City College, a co-educational institution, organized in 1891, under the auspices of the German Methodist Church, which had 246 students at the end of 1901. Pop. 4,227.

Charles City Cross-roads, Battle of. See GLENDALE, BATTLE OF.

Charles River, a river in Massachusetts, which flows into Boston harbor, dividing Boston from Charlestown. The source of the principal branch is a pond bordering on Hopkinton. It is navigable for lighters and large boats to Watertown, seven miles west of Boston.

Charles's Wain, a common name for the constellation of the Great Bear or Ursa Major. Originally instead of Charles's Wain, the name was "carl's" or "churl's wain," meaning the farmer's wagon. Since the time of Homer this constellation has been called a wagon; but since the 17th century the name has been associated with Charles I. and Charles II. Shakespeare calls it Charles's Wain.

Charleston, chärlz'tŏn, Ill., county-seat of Coles County, situated at the junction of the Cleveland, C. C. & S. L. and the Toledo, S. L. & K. C. R.R.'s, 49 miles southeast of Decatur. It has manufactories of woolen goods, carriages, stoves, plows, brooms, and also flour-mills, banks, good schools, and several churches. Pop. (1900) 5,488.

Charleston, S. C., the chief city of the State, and largest on the Atlantic seaboard south of Chesapeake Bay, seat of Charleston County; on the Atlantic C. L. and Southern R.R. (Charleston & S. and South C. & Georgia) systems; 130 miles southeast of Columbia, the capital, and 82 miles north of Savannah. Pop. (1900) 55,807, over half colored.

CHARLESTON

Charleston lies on a peninsula, 10 or 12 miles long and 8 or 10 feet above high water, between the navigable Ashley and Cooper rivers, 2,100 yards and 1,400 yards wide respectively at the mouth; the latter reinforced by the Wando at the city, and the estuary of the three forming a magnificent landlocked harbor, six miles long by three wide, with 40 feet of water at the city, — one of the finest on the Atlantic coast.

The government jetties have scoured a channel across the bar to a mean depth already of 26 feet at low water, or 31 feet at mean high tide, which it is believed will be soon increased by several feet. There are about nine miles of available water front, most of the wharfage being on the Cooper, which is navigable 30 miles to the canal connecting it with the Santee, and so with the west and northwest of the State. Ocean traffic has been quick to follow the favorable new channel opened for it; besides the Clyde Line of steamships, which taps the Atlantic ports from Boston to Jacksonville, and includes Charleston, two ocean freight lines, in 1901, established terminal docks at the city, one to the West Indies and Central America. The prospects for a large commerce with those regions are favorable, Charleston as a distributing port saving the passage around Cape Hatteras out through the Gulf. The resemblance of the city's position to that of New York in its rivers and harbor is striking, and freight here is moved directly from vessel to freight cars, or *vice versa*, without lightering or trucking. The distances from the central West are also favorable, and for the first time in its history Charleston seems entering on a period of rapid growth. The government is aiding in this by its great new navy-yard projects. The naval station has been moved to Charleston, where a tract on the Cooper River about seven miles from the city has been bought; the plans contemplate an outlay of $8,000,000 to $10,000,000, and it will certainly not be less. The harbor is defended by the historic Fort Moultrie, at Sullivan's Island on the eastern side, which the government is improving into one of the best equipped defenses on the coast at a cost of some $500,000; by Fort Sumter on a small island in the centre; and batteries Sergeant Jasper (from a Revolutionary hero) and Capron. Fort Wagner, Fort Ripley, and Castle Pinckney, once celebrated, are now abandoned.

Trade and Commerce. — The Civil War nearly ruined Charleston's commerce, which consisted mainly in exports of cotton (it stood third in the United States, next to New York and New Orleans), rice, and naval stores, to the amount of some $17,000,000 at the time of the War. The silting up of docks, decay of wharves, and destruction of railroads, were repaired slowly, and the commerce which had found new outlets was reclaimed: the total in 1901 being but $7,084,215, of which $6,728,665 was cotton, the remainder being cotton goods, rice, naval stores, and turpentine casks, lumber, phosphate fertilizers, fruits and vegetables. Charleston has a very valuable staple in the Sea Island cotton, with its long fibre, which grows in most perfection on the islands near the city; the raising of fruits and early vegetables for Northern markets also relies on Charleston's shipping facilities.

Manufactures. — The great manufacture of Charleston is fertilizers, from the inexhaustible beds of phosphate rock in the vicinity, discovered by Dr. St. Julien Ravenel some time after the War: out of a total manufactured product valued at $9,562,387 in 1900, $3,967,090 was of phosphates, none other amounting to $500,000. From May 1901 to May 1902, the shipment of manufactured fertilizers was 296,646 carloads; there were 11 establishments, with a capital embarked of $7,868,639, employing 1,409 people besides stockholders, paying $488,842 in wages and salaries, and $2,238,615 for materials. Of the other industries, besides domestic and jobbing ones, like food, clothing, plumbing, etc., the chief were of tobacco products, foundry and machine-shop work, cotton compressing, and oil and rice milling, bagging factories, cigar factories; making baskets to ship fruit and vegetables in, and casks for turpentine; ice, soap, beer, and mineral waters.

Interior, Buildings, Suburbs, etc. — Charleston's long existence for an American city, and its position of leadership in all political movements as well as vital importance in war time, give it much historical interest; and its old garden-set mansions and surroundings are often of great beauty in themselves. It is laid out generally at right angles, but with some picturesque irregularities in the streets; four of these, King Street, the principal retail thoroughfare; Meeting Street; and Rutledge and Ashley avenues, run the entire length of the city, north and south. King Street ends in White Point Garden, a handsome wooded park containing monuments to Sergeant John Jasper and William Gilmore Sims; east of this is the Battery, a broad esplanade 1,500 feet long, affording a noble view of the harbor and the forts. At the junction of Broad and Meeting streets are grouped the public buildings, consisting of the court-house, a solid brick building; the city hall, an imposing structure entered by a double flight of steps, and containing a historical museum with valuable relics; and the new post-office, a magnificent four-story building of Carolina granite, with a tower and all modern appliances, costing about $500,000. The United States custom-house, near Market wharf on the Cooper River, is a superb structure of white marble, costing some $3,000,000. In front of the city hall is Washington Park, containing two handsome fountains and a statue of William Pitt, erected before the Revolution — the British shot off one of the arms in 1780. There are monuments also to the Confederate dead and to John C. Calhoun, and a bust of Henry Timrod, the poet.

The Ashley is crossed by two bridges: that of the Charleston & S. R.R., and a toll-bridge known as the «New Bridge.» Charleston has one of the best electric street railways in the country, having some 30 miles of track within the city limits, connecting with Chicora Park, about four miles from the city, on the Cooper, and with the Isle of Palms, a magnificent seaside resort about 10 miles north of the harbor. It also runs to the suburb of Mount Pleasant, across the Cooper, and eastern side of the harbor, and to Sullivan's Island, about

three miles off, where is a fine bathing beach. Magnolia Gardens, 12 miles west on the Ashley, is a popular summer resort, but the chief one is Summerville, 22 miles northwest, with a dry, cool climate. Of the open spaces near the city, Magnolia Cemetery at the north end, beautifully kept with flowers and shrubs, and with many fine monuments, is the chief. The city has a complete system of tidal drainage, and is in excellent sanitary condition.

Education.— The public-school system, established in 1810, had in 1902, six school buildings, about 100 teachers, and a total attendance of about 7,750, 4,200 colored; besides some 800 in private and parish schools. For higher education, the chief institutions are Charleston College, chartered in 1785, with a museum of natural history and a library; the South Carolina Military Academy, a State institution, established in 1843, one of the foremost military schools in the country, and famed for the active part its students took in the Civil War; Porter Military Academy, including Porter Manual Training Institute; the State Medical College, chartered in 1852; the Charleston and Memminger High Schools; the Academy of Our Lady of Mercy; Smith's School for Young Ladies; University School; and the Avery Normal Institute and the Wallingford Academy for Colored Youth.

Churches and Charitable Institutions.— There are over 60 churches in Charleston, the leading denominations being the Protestant Episcopal and the Presbyterian. It is a Roman Catholic bishop's see, and has a cathedral, St. Finbar's, rebuilt in 1890. The oldest church building is St. Michael's (P. E.), dating from 1761, with a fine chime, of interesting history; the oldest organization, however, is St. Philip's (P. E.), whose building was burned in the great fire of 1835, and whose present one is a Gothic structure of great beauty and originality, with a steeple nearly 200 feet high, bearing at night a beacon, visible far out at sea; and with a churchyard full of distinguished names, including Calhoun, Gadsden, Rutledge, and Pinckney. The Circular Church (Congregational) is also noted; among others of interest are: Grace (P. E.), the Scotch, the Second, and Westminster (Presbyterian), Citadel Square (Baptist), the Old Huguenot, Unitarian, Bethel, and Trinity Methodist, and the Hebrew Synagogue. Of the charitable institutions, the most important are the Orphan House, founded in 1792, the oldest of its kind in the United States; the Euston Home for the Aged; Home for Mothers, Widows and Daughters of Confederate Soldiers; the City and the Roper hospitals; the almshouse; and the Old Folks' Home for Aged Colored People. Among charitable societies are St. Andrew's Society, founded by Scotchmen in 1720, the oldest society in the city; and the South Carolina Society, founded by Huguenots in 1736,— renamed from the Two-Bit Club, so called from the sum contributed by each member at each meeting for the relief of their own indigent.

Banks.— In 1900 there were 3 national and 13 savings and State banks, with an aggregate capital and surplus of over $2,700,000. There were also 14 building and loan associations in active operation, with aggregate capital amounting to about $1,500,000.

Government and Finances.— The government is, by the charter of 1836: a four-years' mayor and a council elected half by wards and half at large. The administrative boards and officials are partly appointive by the mayor and partly elective by the council. The city expenses are about $600,000 a year, of which $60,000 each goes for schools and charities, $75,000 for police, and $50,000 for the fire department. The net debt is about $3,800,000; the assessed valuation of all taxable property, $17,300,000, of which $12,400,000 is real estate; the city tax rate is $26.50 per $1,000, besides a school tax of $1 and a State and county tax of $10.62½.

Population.— In 1790, the first census, 16,359; 1800, 18,924; 1810, 24,711; 1820, 24,780; 1830, 30,289; 1840, 29,261; 1850, 42,985; 1860, 40,522; 1870, 48,956; 1880, 49,984; 1890, 54,955; 1900, 55,807; of which 31,522 were negro.

History.— The first settlement in South Carolina was made at Port Royal by the French, in 1562; it was not successful, but they never forgot the experiment or their favor for the region. In 1670 an English colony under Gov. William Sayle made for Port Royal also; but on the advice of the cacique of Kiawah (the then name of the Ashley), settled instead at Albemarle Point, on the west bank of the Kiawah, three miles from the present site,— fortunately, as the colony Lord Cardross planted at Port Royal was exterminated by the Spaniards in 1686. The settlement was named Charles Town after Charles II. Within two years the settlers had discovered that Oyster Point, the end of the Charleston peninsula, was a better site, and in 10 the latter had become the main settlement and the offices were removed there. The first village was on the Cooper entirely, as the main business still is. The commerce even at this early date was lively, 16 vessels sometimes discharging at once. In 1685–6 a colony of Huguenot refugees settled there and built a church: this strain has deeply molded Charleston and South Carolina, and its fiery zeal in heading every political movement is perhaps due to this quick French blood. In 1704 there were five churches: St. Philip's, the Huguenot, the First Baptist, a Presbyterian and Congregational meeting-house, and a Quaker one. In August 1706 an allied French and Spanish fleet attacked it, but were driven off by a small improvised fleet under Lieut.-Gov. Rhett; shortly afterward another French vessel, unaware of the others' defeat, came up and landed a party, which was routed with heavy loss, and the survivors, with the ship and the rest of the marines, captured. The city at this time was desolated with yellow fever, but this militia action counts among the brilliant feats of the War of the Succession. In 1755 a colony of 1,200 deported Acadians settled there, still further reinforcing the French element. In 1773, Josiah Quincy of Boston writes in his diary that the town was "beautiful and in many respects magnificent"; and "far surpassed everything he ever saw or expected to see in America." It was at this time the third seaport in size in America, and in 1774 established a chamber of commerce. It

was not only the first Southern city to join the Revolutionary movement, but was the prime agent in bringing about the first provincial congress 10 years before; it held the first constitutional convention in any colony in March 1776, and promulgated an independent constitution. On 28 June the British fleet, under Sir Peter Parker, besieged the city, and was beaten off with terrible loss by the garrison of Fort Moultrie behind an improvised palmetto fortification. In 1779 a second attack under Gen. Augustine Prevost was defeated. But on 12 May 1780 Sir Henry Clinton with 16,000 men captured it and its garrison of 7,000 under Gen. Lincoln, after a six weeks' siege; it was not reoccupied by the Americans till 14 Dec. 1782. In 1783 it was incorporated as a city, and remained the capital of South Carolina till 1790. In 1784 it exported the first bale of cotton sent from the United States to Europe. In 1793 some 500 French refugees from the massacres of San Domingo settled there. It was the heart of the nullification movement in 1832, as of all movements to oppose Federal authority first and last; and the Breckenridge convention of 1860 met here before adjourning to Baltimore. The convention which proclaimed the State's secession from the Union was held here 20 Dec. 1860. The Civil War was begun by its bombardment and capture of Fort Sumter on 12-13 April 1861; and from 7 April 1863 on, for nearly two years, the fort was incessantly besieged and steadily bombarded by the Union fleet, for the last 18 months it being only a heap of ruins, but impregnable. On 17 Feb. 1865, on the surrender of Columbia, Hardee evacuated the city and burned all public buildings, stores, and shipping, and the next day Foster and the union forces took possession. Despite its devastation and wreckage, it grew 21 per cent from 1860 to 1870, while it had fallen off in the previous decade,—a curious phenomenon. In 1886, on 31 August, the heaviest earthquake ever recorded in the United States destroyed several hundred buildings, and made three fourths of the whole uninhabitable, killed scores of people, and caused a property damage estimated at $8,000,000. On 2 Dec. 1901 the South Carolina Interstate and West Indian Exposition was inaugurated in the city.

(For a compact sketch of its history, see Yates Snowden in Powell's 'Historic Towns of the Southern States'; in connection with State history, McCrady's three volumes of South Carolina history, 1897-1901.)

HENRY TUPPER,
Secretary Chamber of Commerce.

Charleston, W. Va., a city, capital of the State, and county-seat of Kanawha County, at the junction of the Kanawha and Elk rivers, on the Chesapeake & O., the Ohio Cent., and the Charleston, C., and Sutton R.R.'s, 130 miles south by west of Wheeling. It is an important commercial, lumber, and coal-mining centre, with steamer communications with all Ohio and Mississippi River ports. In 1900 it contained 119 manufacturing establishments, valued at $1,371,807. It has extensive salt springs, State-house, custom-house, hospital and opera house, three national banks, several daily and weekly newspapers, and an assessed property valuation of over $4,000,000. Pop. (1900) 11,099.

Charleston Phosphate, a valuable fertilizer obtained at Charleston, S. C., and classed as "land" or "river" phosphate, the latter being procured by dredging. It was discovered in 1837 by Francis S. Holmes, but its value was not demonstrated until 1867. For over 20 years South Carolina was the chief source of the world's supply. In 1888 the phosphate rock was found in Florida, and later in several other States, including North Carolina and Tennessee. In 1897 nearly 1,000,000 tons were mined, of which Florida supplied fully a half, and South Carolina rather less. The river phosphate occurs in nodules washed out of the original Tertiary formations and ranging from a half inch to two feet in diameter. They usually contain 50 to 60 per cent of "bone phosphate." See FERTILIZERS.

Charlestown, Mass., since 1874 a part of the municipality of Boston, previously a separate city and seaport. The principal public buildings are the State prison, the hospital for the insane, a market-house, school houses and churches. One of the chief navy yards in the United States, occupying an area of about 100 acres, is in the southeast part of Charlestown. Charlestown was the scene of stirring events in the Revolutionary War. See BUNKER HILL, BATTLE OF.

Charlestown, South Africa, a town in the extreme north of Natal, on the railway from Durban to Johannesburg. It stands at a height of over 5,300 feet. Majuba Hill is four miles distant.

Charlestown, Va., a village and county-seat of Jefferson County: situated on a branch of the Baltimore & O. R.R., 10 miles southwest of Harper's Ferry. It is the centre of an agricultural region, is noted as being the place of trial and execution (2 Dec. 1859), of John Brown (q.v.), and has a national bank, several weekly newspapers, and an assessed property valuation of about $1,000,000. Pop. (1900) 2,392.

Charlet, Nicolas Toussaint, nĭk-ō-lä toosăṅ shär-lä, French painter and engraver: b. Paris 20 Dec. 1792; d. Paris 29 Oct. 1845. He held a clerkship under the Empire, but lost it at the Restoration (1815), and afterward devoted himself to art. After studying awhile under Gros, he gradually formed for himself a style in which he had no rival. He was especially successful in his sketches of children and military incidents. His drawings numbered about 2,000.

Charleville, shär-lē-vēl, France, a town in the department of Ardennes, on the left bank of the Meuse, opposite Mézières, with which it communicates by a suspension bridge. It is regularly built, has straight, wide, and clean streets, and a public square and fountain, surrounded by arcades, from which the four principal streets diverge. It carries on various industries: and the Meuse affords facilities for a large traffic. Charleville was built in 1606 by Charles, Duke of Nevers and Mantua, and named after himself. Pop. (1891) 17,390.

Charlevoix, Pierre François Xavier de, pē-ār fräṅ-swä ksăv-ē-ā dė shär-lē-vwä

French Jesuit traveler: b. St. Quentin 29 Oct. 1682; d. La Flèche 1 Feb. 1761. He twice visited Canada, and voyaged down the Mississippi to New Orleans. He published his journal, histories of San Domingo, Japan, and Paraguay, and a 'History of New France.' He wrote also a 'Life of Blessed Mary of the Incarnation,' the foundress of the Ursuline nuns in America.

Charley, SIR **William Thomas,** English jurist (retired since 1892): b. Woodbourne 5 March 1833. He has published 'The Judicature Acts' (1873–5); 'The Real Property Acts' (1874-7); 'The Crusade Against the Constitution, an Historical Vindication of the House of Lords' (1895); 'Mending and Ending of the House of Lords' (1900).

Char'lock, a small, cruciferous plant with yellow flowers, commonly called wild mustard. See MUSTARD.

Char'lotte Augusta, Princess, daughter of Queen Caroline and George IV.: b. Carlton House 7 Jan. 1796; d. 5 Nov. 1817. She was carefully educated and highly accomplished. In 1816 she married Prince Leopold of Coburg, afterward King of the Belgians.

Charlotte, shär'lŏt, N. C., a city and county-seat of Mecklenburg County, on Sugar Creek, the Southern and the Seaboard A. L. R.R.'s, 226 miles northeast of Atlanta, Ga. It is the trade centre of Mecklenburg and surrounding counties, and also the centre of the Southern cotton-mill industry, having 100 mills within a radius of 200 miles; is the seat of Biddle University and a military institute; has several churches, parks, opera houses, public library, four national banks, and several weekly newspapers. The Mecklenburg Declaration of Independence was adopted here in 1775, and the city was occupied by the British in 1780; assessed property valuation, about $5,000,000. Pop. (1900) 18,091.

Charlotte Amalie, shär-lŏt' ä-mä'lē-ē, Danish West Indies, capital city of the island of St. Thomas. It has an excellent harbor, landlocked from all winds, contains several churches, and is an entrepôt for goods for the neighboring islands. Pop. 9,000.

Charlotte Harbor, Florida, the mouth of the Peace River, in De Soto County, in the southwestern part of the State. This harbor is very shallow, not exceeding in depth more than 10 feet; it extends inland 24 miles. It is protected on the west side by a long chain of islands.

Charlottenburg, shär-lŏt'tĕn-boorg, Prussia, adjoining Berlin on the west, and now practically forming part of it, on the banks of the river Spree. It contains a palace built for Sophia Charlotte, the first queen of Prussia, which was begun at the end of the 17th century — hence the name of the place. The town was founded soon after, but made little progress until the middle of the 19th century. Since then it has made extraordinary progress, having shared in the prosperity and extension which the capital has experienced. The town contains various important educational and other institutions, including a school of artillery and engineering, and a technical high school. Among the churches is the Kaiser Wilhelm Memorial Church, consecrated in 1895. A beautiful walk starting from the Brandenburg gate, at the head of the famous Berlin Street, *Unter den Linden,* and passing through the park known as the *Thiergarten,* ends here. Charlottenburg is a favorite resort and residence of the Berlinese. In the garden adjoining the castle is the tomb of Frederick William III. and his consort Queen Louisa, by Rauch. Here also their son, the Emperor William I., was buried in 1888. Pop. (1900) 189,290.

Charlottesville, shär'lŏts-vĭl, Va., the county-seat of Albemarle County, is on the Chesapeake & O. and the Southern R.R.'s, 96 miles southwest of Washington. It is the seat of the University of Virginia and of Monticello, the home of Thomas Jefferson; is a popular summer resort; has important manufactures, electric lights and street railways, a national bank, several daily and weekly newspapers, and an assessed property valuation of over $1,500,000. Pop. (1900) 6,449.

Charlottetown, shär'lŏt-town, Prince Edward Island, Canada, capital of the province, situated in Queen's County, on Hillsborough Bay, at the confluence of three rivers, and on the Prince E. I. R.R. The city is well laid out, and has an excellent harbor, a fine colonial building, post-office, Y. M. C. A. building, and an insane asylum. It is the seat of Prince of Wales College, St. Dunstan's College, and a Methodist college; has a high school, a business college, and several common schools, and many industries, including foundries, machine shops, carriage and furniture factories, breweries, etc. Charlottetown is connected with various parts of the Dominion by steamship lines. It is lighted by gas and electricity; has an extensive waterworks system, several daily and weekly newspapers, and banks, and is the see of a Roman Catholic bishop. Pop. (1901) 12,080.

Charlton, chärl'tŏn, **John,** Canadian statesman: b. near Caledonia, N. Y., 3 Feb. 1829. He was in early life a clerk, but removed to Canada in 1849, and entered business and political life. He was elected as a Liberal to the Canadian House of Commons in 1872, and has held his seat continuously since then. He is best known as a promoter of moral legislation. He has published 'Parliamentary Recollections.'

Charlton, John, English artist: b. Bamborough, Northumberland, England, 28 June 1849. He studied art at Newcastle and South Kensington, and beginning to exhibit at the Royal Academy in 1870 has exhibited there regularly since that date. Among important works of his are 'Stag at Bay'; 'Reynard's Requiem'; 'God Save the Queen'; 'The Funeral of Queen Victoria.'

Charm, anything believed to possess some occult or supernatural power, such as an amulet, spell, etc., but properly applied (as the name, derived from Lat. *carmen,* a song, indicates) to spells couched in formulas of words or verses.

Among celebrated charms the Danish Danebrog, or national banner, stands prominent. This banner was said to have been woven in a

day and a night by three daughters of a celebrated Norse chieftain, of the race of Ynglings, said to be descended from the god Odin. These girls were deeply versed in the lore of the gods, giants, dwarfs, and norns, and in the centre of the banner they placed a raven, the bird of Odin, wonderfully lifelike and realistic. The superstition was that the result of a battle was foretold by this raven, which if victory was to fall to the possessors of the banner, held its head and bill in an upright position.

By observing this banner the Danes in three years' time had won 27 important battles, going into action only when the raven looked skyward. If the bird looked droopy and held its head low, they remained in camp, or, if in action, and the attitude of the raven suddenly changed, they withdrew from the field.

Alfred, the king of the English Saxons, noting the enthusiasm which this banner inspired in the Danes, determined to capture it, and succeeded after a savage battle in which the Danes fought desperately for three hours. When, however, it fell into the hands of the Saxons, and the head and wings of the raven drooped, there was a general rout. The Danes were models of courage and bravery as long as superstition fanned the fire of faith in their hearts, but they were arrant cowards the minute they realized that their idol was powerless to protect them.

Another curious charm is to be seen in the National Museum at Washington. This is a necklace of human fingers which was captured from the Sioux Indians in 1876, the loss of which brought about the subjection of the Indians.

Charmian, kär'mĭ-ạn, an attendant on Cleopatra in Shakespeare's 'Antony and Cleopatra.' After Cleopatra's suicide, Charmian also made away with herself.

Charnay, Claude Joseph Désiré, klōd zhō zĕf dā-zē-rā shär-nā, French traveler: b. Fleuieux 2 May 1828. In 1857–61 he traveled in Mexico in behalf of the French ministry of education; from 1863 to 1878 he went on a number of expeditions to North and South America, Australia, and other countries. In 1880 he conducted an expedition to the ruined cities of Mexico, the expense of which was borne by Pierre Lorillard; and in 1886 again visited Yucatan. He has written 'Le Mexique, Souvenirs et Impressions de Voyage'; and 'Les Anciennes Villes du Nouveau Monde' (translated into English).

Char'nel-house, a chamber or building under or near churches, where the bones of the dead are deposited. In England the crypts of some churches were formerly used as charnel-houses.

Charon, kā'rŏn, in mythology, the son of Erebus and Night. It was his office to ferry the dead in his crazy boat over the dark waters of Acheron, over Cocytus resounding with the doleful lamentations of the dead, and finally over the Styx, dreaded even by the immortals. The shades were each obliged to pay him an obolus, which was put, at the time of the burial, into the mouth of the deceased. Those who could not pay the fare, or had been so unfortunate as to find no grave in the upper world, were compelled to wander on the desolate banks of the Acheron till Charon was pleased to carry them over to their final resting-place. He was represented as an old man, with a gloomy aspect, matted beard, and tattered garments. The traditions relative to Charon are posterior to the Homeric age, and it is thought by some of the learned that the myth was imported into Greece from Egypt.

Charost, Armand Joseph de Bethune, ärmäṅ zhō-zĕf dė bā-toon shä-rōst, Duke of: b. Versailles 1728; d. 27 Oct. 1800. He was a descendant of Sully, and distinguished himself on many occasions in the military service of his country. He was particularly active in the promotion of agriculture and public institutions. Long before the Revolution he abolished the feudal services on his estates, and wrote against feudal institutions. He established charitable institutions in sundry parishes, provided for the support and instruction of orphans, employed physicians and midwives, founded and liberally endowed a hospital. In a year of dearth he imported grain into Calais at his own expense. In the provincial assemblies he spoke against the *corvées.* In the assembly of the notables he declared himself for an equal distribution of the public burdens. During the Reign of Terror he retired to Meillant, where he was arrested, and did not obtain his liberty until after the 9th Thermidor. In the testimonies given in his behalf by the revolutionary committees he was called the father and benefactor of suffering humanity. He returned to Meillant, where he established an agricultural society. No sacrifice was too great for him, and his vast fortune was scarcely sufficient for his enterprises.

Charpentier, François Philippe, fräṅ-swä fē-lēp shär-päṅ-tē-ā, French engraver and mechanic: b. Blois 3 Oct. 1734; d. there 22 July 1817. He studied copper engraving in Paris, and invented the aquatint process in engraving. Among his engravings by this process are 'Perseus and Andromeda'; 'The Beheading of John the Baptist'; 'A Shepherd'; 'The Italian Concert'; and 'The Children's Bacchanal' after De Witt. On account of his invention he was given the position of royal mechanic; in this capacity he perfected the lamps of lighthouses and devised a number of improvements in cannon and other firearms.

Charpentier, Gustave, French composer: b. Dieuze 1860. He was a pupil of Pessard and Massenet at the Paris conservatory; and won the grand prix de Rome in 1887. He has written a number of songs: 'Napoli,' a symphony; 'The Life of a Poet,' a symphonic drama; and an opera, 'Louise.' For the two latter he wrote both words and music.

Charpentier, Johann Friedrich Wilhelm Toussaint, German mining engineer: b. Dresden 24 June 1738; d. Freiberg 27 July 1805. He studied law and mathematics at Leipsic, then took a position as instructor in mathematics at the mining school of Freiberg, where he devoted himself to the study of mining methods. He investigated the improved process of amalgamation used in Hungary and introduced it in Germany, besides furthering a number of other improvements. He wrote

'Mineralogische Geographie der Kursächsischen Lande' (1778); 'Beiträge zur Geognostischen Kenntnis des Riesengebirges Slesischen Anteils' (1804).

Charpentier, Louis Eugène, loo-ē ė-zhān, French painter: b. Paris 1 June 1811; d. 7 Dec. 1890. He was a pupil of Gerard and Cogniet, and was professor of design at the Lycee at Versailles for over 20 years. He was best known as a military painter. His first picture of importance was 'Bivouac of the Cuirassiers'; among other of his works are 'Halt of the French Army on the Saint Bernard'; 'Battle of Tchernaia'; 'Imperial Guard of Magenta'; 'Retreat from Inkermann'; 'Wellington in Spain'; 'Charge of Cuirassiers at Waterloo.'

Charpentier, Marc Antoine, French composer: b. Paris 1634; d. there March 1702. He went to Rome with the intention of studying painting, but turned his attention to music and became a pupil of Carissimi. Returning to Paris he held the position of chapel-master at several places, finally at the Sainte Chapelle. He was the most prominent rival of Lully. He wrote several operas, 'Tragédies Spirituelles' for the Jesuit order, and a number of pastorales.

Charpie, shär-pē. See LINT.

Charpoy, chär'poi, in the East Indies, a small, portable bed, consisting of a wooden frame resting on four legs, with bands across to support the bedding.

Charqui, chär'kē, jerked beef, the Chilean name of which the English term is a corruption.

Charras, shär-rä, **Jean Baptiste Adolphe,** a French republican soldier and statesman: b. Pfalzburg, Lorraine, 7 June 1810; d. Basel, Switzerland, 23 Jan. 1865. He took part in the revolution of 1830, was promoted in 1833 to the rank of lieutenant, wrote a series of able articles in the 'National' on military affairs, which gave umbrage to the government and caused him to be sent to Algeria; distinguished himself there on the battlefield as well as in the training of native troops and the colonization of the country. After the revolution of 1848 he became under-secretary of state and representative for the department of Puy de Dôme. He was one of the victims of the *coup d'état* of 2 Dec. 1851. First detained at Ham, he was transported to Belgium in 1852, but expelled from that country in November 1854, at the request of Louis Napoleon, whom Charras had denounced on many occasions, but most effectively in a letter of which 50,000 copies were printed in Belgium alone. A remarkable work from his pen, 'Histoire de la campagne de 1815,' appeared in 1857.

Charras, chär'ras or chŭr'ras, a resinous substance which exudes from the Indian hemp and is collected for use as a narcotic or intoxicant, forming a considerable article of trade in Asia. See HEMP.

Charriere, shär-rē-är, **Madame St. Hyacinthe de,** French authoress, well known under the assumed name of the ABBÉ DE LA TOUR: b. Holland about 1740; d. 20 Dec. 1805. In early life she became a maid of honor at the court of the Stadtholder. Her affection for her brother's tutor, M. de Charrière, a worthy but decayed nobleman, led her to forego her rank and family, and shortly after her marriage she retired with him to a small property at Neufchâtel. Her lively temperament was ill suited for the monotony of a rustic life, and accordingly seeking amusement in literary recreations she soon acquired a considerable reputation. Having lost the greater part of her fortune in the French Revolution, she reduced her expenditure to the lowest possible amount, that she might be able to continue her various acts of benevolence. Her works belong chiefly to the class of light literature. Among others may be mentioned 'Les Trois Femmes'; and the favorite dramas of 'Le Toi et le Vous'; 'L'Emigré'; 'L'Enfant Gâté'; and 'Comment le nomme-t-on.' All these productions not only display much wit, truth, and powerful description, but also breathe a spirit of philosophy, and have a strong moral tendency. Most of them were translated into German by her friend Herder.

Charron, Pierre, pē-ār shä-rôn, French preacher and writer: b. Paris 1541; d. 16 Nov. 1603. He studied law at Orleans and Bourges, and had practised for six years as a parliamentary advocate when he turned his attention to theology, and gained so much fame by his sermons that he was presented in rapid succession with several benefices in Gascogny and Languedoc, and appointed court chaplain to Queen Margaret. In 1588 he returned to Paris with the view of fulfilling a vow he had made to enter the Carthusian order, but owing to his age the prior of the order refused him admission, and the Celestines also declining to receive him, he continued a secular priest. In 1589 he went to Bordeaux and became very intimate with Montaigne, whom he tried to imitate, though he failed to catch his ease of style, and original, piquant wit. His principal works are 'Traité des Trois Vérités,' and 'Traité de la Sagesse.' The Roman Catholic zeal of the former drew down upon him the rebuke of Duplessis-Mornay; and the extreme liberalism of the latter exposed him to a charge of atheism, the treatise being condemned both by Parliament and the University.

Chart, a representation of a portion of the earth's surface projected on a plane. The term is commonly restricted to those intended for navigators' use, on which merely the outlines of coasts, islands, etc., are represented. A globular chart is a chart constructed on a globular projection. A Mercator's chart is a chart on the projection of Mercator. A plane chart is a representation of some part of the superficies of the earth, in which the spherical form is disregarded, the meridians drawn parallel, the parallels of latitude at equal distances, and the degrees of latitude and longitude equal. A selengraphical chart is a chart representing the surface of the moon; and a topographical chart is a chart of a particular place, or of a small part of the earth.

Charts are designed to assist the navigator and to subserve the interests of commerce. For purposes of navigation they may embrace large areas, like one of the great oceans or seas, delineating the conformation of the shores and outlying dangers, and perhaps indicating the principal currents and winds that may be utilized

in determining the most advantageous routes between specified localities. Charts may also embrace much smaller areas, but on larger scales, permitting greater fullness of detail, and thus presenting graphically the channels that can be followed, with the depths of water, the position of lights, beacons, spindles, buoys, and other objects provided to indicate the way to the stranger. Charts of these classes are usually designated "Navigation charts," although they may also be useful for other purposes.

Nearly all civilized nations have published charts of their coast lines in greater or less detail, and the principal maritime nations copy those issued by other nations, and thus maintain for the use of their own seamen charts of all parts of the world to which their commerce may extend. Great Britain maintains the most extensive establishment for the purpose, and issues the most complete series of charts; she has also made the most extensive surveys of uncivilized coasts for cartographic purposes.

The United States Coast Survey, a vast undertaking, was begun in 1807, carried on intermittently till 1845, and since then more systematically, save during the Civil War, under Prof. Bache, Prof. Pierce, and their successors. The coasts of the United States are surveyed and the charts produced by the Coast and Geodetic Survey attached to the Treasury Department, which also makes researches to determine the origin and courses of the Gulf Stream (q.v.). Unsurveyed foreign coasts are surveyed by the Bureau of Navigation, the charts being produced by the Hydrographic Office of the Navy Department. This bureau also duplicates charts and plans issued by other nations. The Coast and Geodetic charts are sold at from 10 cents to $1 each, being the cost of printing and paper. Naval vessels are supplied free. The charts are obtainable at Coast and Geodetic Survey agencies at all seaports of the United States. They exhibit accurate and minute topography as far inland as will supply landmarks for the navigator or serve for purposes of defense; the shore line at high water, and sanding to mean low water; soundings, contours, and material of bottom at different depths; bars, channels, sailing ranges and directions; true meridian and compass variation; rocks, reefs, buoys, beacons, lights; tide establishment; detailed explanation of lighthouses and signal stations. They are carefully corrected for every substantial change in any of those features. They range in scale from $\frac{1}{2400}$ (30.401 inches to the nautical mile) to $\frac{1}{1200000}$ ($\frac{61}{1000}$ of an inch to the nautical mile). The Coast and Geodetic Survey issues four series of charts on the Atlantic and Gulf coasts of the United States, and three series on the Pacific coast, designed to subserve the purposes the surveys were established to meet. The first series includes "sailing charts," which embrace long stretches of coast, as from the Bay of Fundy to Cape Hatteras, Chesapeake Bay to the Bahamas, etc., and are intended to serve for offshore navigation, or between the greater headlands, as Cape Cod, Cape Hatteras, etc., and between distant harbors, as Boston to Chesapeake Bay, Charleston, etc. They show only the outline of the continent, the seacoast lights, and geographic information that will be useful for the purposes intended. The second series includes "general charts of the coast," also designed for purposes of navigation. They are on a scale three times as large as that of the first series, and embrace more limited areas, as the Gulf of Maine, Gay Head to Cape Henlopen, Galveston to the Rio Grande, etc. These charts serve the navigator in coasting alongshore between headlands, and in approaching harbors. Those of the third series, called "coast charts," embrace the whole coast on a uniform scale five times as large as that of the second series. Such charts are necessarily confined to comparatively short stretches of coast, as Sandy Hook to Barnegat, the entrance to Chesapeake Bay, Mobile Bay, etc. One inch on the paper represents about 1¼ statute miles, a scale sufficiently large to give the features of the topography and hydrography with great clearness, portraying the appearance of the coast and the irregularities of the bottom with a detail quite close enough for the navigation of the principal harbors. The fourth series consists of "harbor charts" on large scales, intended to meet the needs of local navigation. On the Pacific coast the first series is similar to that on the Atlantic coast, and extends from San Diego, Cal., to Point Barrow, Alaska. The second series is on a scale six times as large as the first, and is suitable for alongshore navigation and inland passages of southeast Alaska. The third series includes charts on scales like those of the fourth series on the Atlantic coast.

All these series of charts are published from the same original surveys, the details of the original work being generalized or omitted to meet the requirements any particular series is intended to subserve. Various methods are available for producing charts of these classes, but experience has demonstrated that on coasts like large portions of those of the United States, which are subject to frequent changes from natural causes, necessitating extensive corrections, engravings upon copper are the most expedient and economical. The engravings afford the additional advantage of being readily duplicated by the electrotyping process. All the standard charts issued by the bureau are therefore copperplate engravings. Preliminary editions, however, are frequently issued by means of the photo-lithographic process, which affords a cheap and ready method for temporary purposes.

The Survey publishes about 500 charts, with an average annual issue of 70,000 copies.

Char'ta, Magna. See MAGNA CHARTA.

Charte, shärt, a term originally used to indicate the rights and privileges granted by the French kings to various towns and communities. The first such charter in France is known as the *Grande Charte,* or the Charter of King John (1355). At present by the Charte is meant the fundamental law of the French monarchy, as established on the restoration of Louis XVIII. in 1814. As is well known, it was the violation of an article of the Charte by the ministers of Charles X. that led to the revolution of 1830, the expulsion of that monarch from the throne, and the accession of Louis Philippe, who, on 29 Aug. 1830, swore to a new charter, sensibly modifying that of 1814 in a liberal sense. After 18 years' sway, Louis Philippe was himself expelled from France, 24 Feb. 1848, and therewith the Charte which he was called to support fell to the ground.

Charter, a document by which a superior power grants permanent or continuing rights and privileges to an inferior, either a person or persons, corporation or institution, colony, municipality, etc. Originally it had the broader sense, now obsolete, of a conveyance of land. The mediæval charters ranged from a grant of political rights by a sovereign to an entire people,— like the Great Charter of England or the Golden Bull of Hungary, or colonial instruments of government conferring the broadest rights of sovereignty,— down to permissive acts for abbeys and colleges or trading companies, or confirmations of rights already given (called confirmatory charters). The first-named class in modern usage is called a constitution. Thus, the agreements by which recent monarchs have deprived themselves or been deprived of absolute power and shared it with their people, as with Austria in 1866, Japan in 1868, etc., are essentially the same as Magna Charta. Charters in present usage are restricted to municipalities, corporations, and institutions.

The charters for the American colonies were usually distinguished from "patents" by granting specific privileges of jurisdiction and legislation, and in general the powers needed to establish and continue a self-regulating community, instead of mere general grants of land and rights of settlement; but the two were often loosely used as interchangeable. Thus, in the acknowledgment of receipt of their charter in 1662, the Connecticut officials acknowledge also the "old charter," meaning the Warwick Patent. Strictly, they were all patents, as granted by the king under letters patent; but in use, only the grants to individuals were commonly termed patents, the word charter being reserved for those to companies and to colonies already established. Of these three species, the first includes the patents to Lord Baltimore for Maryland in 1632, to Gorges for Maine in 1639, to the Duke of York (afterward James II.) for New York in 1664, and to William Penn for Pennsylvania in 1681. The second comprises those to the Virginia Company in 1606, 1609, and 1612, the Plymouth and London companies in 1606, the Council for New England in 1620, the Massachusetts Bay Company in 1629, the proprietors of Carolina (1663) and Georgia (1732). The third has the two exemplars of Rhode Island (1643, confirmed 1663), and Connecticut (1662): instruments of such complete self-government that those States made no change at the Revolution, the former living under its 17th-century charter till 1818, and the latter till it was forced to change it by the Dorr Rebellion of 1842. The legal nature and implications of these documents were keenly disputed in the age when their interpretation was vital, and have been argued with scarcely less heat for historical reasons since. According to the English view, they were concessions granted by the government for political reasons, and revocable at its pleasure for the same reasons; the title to the lands as well as to the political privileges lay with the government, and its right to vacate either was limited only by policy; and charter governments had only such powers as were specifically given them in the charters. James II. put some of these theories in practice in the union of New England in 1685, and others were acted upon generally. On the other hand the colonial view was set forth by Jeremiah Dummer in his 'Defense of the Charters' (1728); at least it was widely adopted. It was, that the charters were compacts between the government and the colonies, in consideration of the latter having cleared and taken possession of the territory and annexed it to the crown; and that the crown possessed only political rights there, the land title being derived from purchase and occupation and their own courage and labor. As to the powers of the charter governments, Judge Story holds that they possessed full sovereignty and power of legislation and taxation, subject only to not contradicting the laws of the mother country. The truth is that neither side had any very definite views on the matter at the outset, and both developed antagonistic ones under the stress of interest.

In the United States, charters (special or general) are granted by acts of the several State legislatures or by the national government. Thus, the national banking act, and the general railroad acts of most States prescribe the conditions under which corporations of those classes may organize without special permission, and their articles of association are their charter. The act by which a county or township is set off as an administrative division of a State is not termed a charter. On the other hand, that by which a municipality is organized, as a city or borough, is always so termed; but it has the vital distinction from a private charter that it is not a contract; the municipality has no vested rights, being a mere governmental agency and convenience; and the charter can be altered or repealed at any time by the legislature. A private charter, on the other hand, is a contract which cannot be repealed or modified by the public power unless such liberty has been expressly reserved in the charter itself. See DARTMOUTH COLLEGE CASE.

Charter-house, a celebrated school and charitable foundation in London, England. In 1370 Sir Walter Manny and Northburgh, Bishop of London, built and endowed it as a priory for Carthusian monks (hence the name, a corruption of *Chartreuse,* the celebrated Carthusian convent). After the dissolution of the monasteries it passed through several hands till it came into the possession of Thomas Sutton, who converted it into an hospital, richly endowed, consisting of a master, preacher, head schoolmaster, with 44 boys and 80 indigent gentlemen, together with a physician and other officers and servants of the house. Each boy is educated at a certain expense, and each pensioner receives food, clothing, lodging, and an allowance of about $150 a year. The pensioners, "poor brethren," must be over 50 years of age, and members of the Church of England. The Charter-house School has been removed to new buildings near Godalming, in Surrey, while the non-academic department of the Charter-house still remains in the old buildings. The school has a high reputation, and many lads are educated there other than the scholars properly so called. Several of the famous men who have received their education at the Charter-house are Isaac Barrow, Addison, Steele, John Wesley, Blackstone, Grote, Thirlwall, Havelock, John Leech and Thackeray.

Charter Oak, a tree nearly seven feet in diameter, formerly in Hartford, Conn.; it blew down in a storm, 21 Aug. 1856. A section of its trunk was preserved in the rooms of the Connecticut Historical Society; the remainder — currently believed to rival in miraculous powers of reproduction the loaves and fishes or the Mayflower furniture — was kept or sold for small souvenirs. It is thus venerated from a tradition, first accredited to it in 1789, that in a hollow of it was concealed the charter of Connecticut rescued from Andros in 1687; earlier ones specify an elm, others the houses of different persons. This is of little moment; but the adventures of the charter form a mystery which the latest investigations, instead of illuminating, render utterly insoluble. The contradiction of unquestionable facts is absolute. The story without these is sufficiently peculiar. James II., wishing to make Connecticut a part of his consolidated New England under Andros (q.v.), found its charter in the way; and as the colony declined to surrender it, he brought writs of quo warranto to vacate it, the last of which was returnable in February 1687. To delay or avoid voluntary surrender, yet escape forfeiture and entire outlawry of rights, they replied that they would much rather stay as they were, but if they could not, preferred a provincial union under Andros over annexation to any other province. The Council chose to consider this a formal waiver of charter rights, and dropped proceedings under the writ; and on 31 Oct. 1687 Andros rode over from Norwich to Hartford, under orders to assume the government. Calling the governor and council together, he demanded surrender of the charter according to their dutiful assurances. The meeting was secret; what happened we learn only from tradition, and the brief account of a later intimate of the actors. The colonial officials protested and debated till after dark; that this was prearranged is not only morally certain in itself, but Trumbull's account of a long speech by the governor, to no conceivable purpose otherwise, deepens the certainty. Candles were lighted; the charter was (or the charters were) at last brought in and laid on the table; suddenly some officious candle-snuffers put out all the lights, and when they were relighted no charter was to be seen. But if Andros had no longer a charter to suppress, equally the colony had no longer one to appeal to; the old government was just as effectually extinguished as if they had let him have the paper, they cannot have foreseen a revolution in England, and it is not evident what they intended to do with it. Most likely, from their previous actions, it was merely to save their "face" from the humiliation of a formal surrender. There was no outcry by Andros, no charge made against the officials, no appearance of ill-will to them, no report of the affair to England, seemingly no disclosure of it to the train of Massachusetts magnates who accompanied him (and may or may not have attended the meeting), or to any one else; and (perhaps the most curious of all the circumstances of this curious affair) both our informant and tradition stop short at the relighted candles and the missing document, and give no hint what Andros said or if he said anything, or whether he seemed puzzled or offended, or any of the immediate sequelæ of the business. The governor (Treat) had called a meeting of the General Court, which accepted the situation and the annexation; the secretary inscribed it on the colonial records and wrote "Finis" on them; and the next day Andros publicly proclaimed his commission. When James was overthrown and Andros with him, the colony resumed its government, appealed to its charter brought from hiding, and the English authorities admitted without trial that it had never been vacated. But that was chance and not foresight. This, however, is only the beginning of mystery. The charter, obtained by Gov. John Winthrop from Charles II.'s council in April 1662, was engrossed in duplicate, and the official fees are entered on the English records. No other copies were made, nor could have been unless both the others were lost; and neither was lost. The first copy was sent to the colonial government, which acknowledges receipt of "the charter, the duplicate and the old copy of the former charter" (that is, the Warwick Patent). Duplicate of what? It is usually assumed to mean, of the charter; but the facts to be cited prove that it was of the patent. Winthrop was to bring over the duplicate of the charter with him; and a legislative committee was appointed to receive it from him. That he did not, is conclusively shown by a letter from the colony to its agent, William Whiting, in 1686, instructing him to obtain it from James Porter in London, with whom Winthrop had left it, and use it in defending the colony's rights before the council. That Winthrop may have taken it across once more on official business, and left it there, is barred out by the fact that he never visited England again. That Whiting sent it back within the next year, is equally negatived by the fact that he continued to need it there and the colony did not need it at all, that he would not have sent it without orders and they gave him no such orders, and that in his correspondence there is no letter of transmittal. Furthermore, a legislative committee of 1715 voted a money acknowledgment to Joseph Wadsworth for safely preserving the "Duplicate Charter" when "our constitution was struck at": it is absurd to suppose they made him the grant for preserving a second copy when they had one safe already. Obviously, the one he preserved was the only one they had. On the other hand, Roger Wolcott, the first narrator (1759), distinctly says that "the charters were set on the table," and that when the candles were relighted the *charters were* gone. Still more specifically, President Stiles of Yale writes in his Itinerary, as from Wolcott, that Nathan Stanley took one copy and Gov. Talcott's father the other. Wolcott was only eight at the time; but by 1714 he was in the council, in 1715 was on the very committee which made the grant to Wadsworth, and was certainly intimate with many who were present at the scene and probably helped arrange it. We have, then, the certain fact that there was but one copy of the charter in America in 1687, set against the positive assertion of one who must have known, that two were abstracted. Still a third mystery is, that Wadsworth was not present at the meeting and could not have taken the paper; that Wolcott, who publicly honored Wadsworth as the savior of the charter, privately gives all the credit to others and does not even mention Wadsworth,

and that the names he cites are really those of members present; and that if one of the actual abstracters passed it to Wadsworth waiting outside, he and not they should receive the public acknowledgment. The writer can guess at solutions to these problems, but all solutions are guesses alike.

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Charter-party, a contract executed by the freighter and the master or owner of a ship, containing the terms upon which the ship is hired to freight. The masters and owners usually bind themselves, the ship, tackle, and furniture, that the goods freighted shall be delivered (dangers of the sea excepted) well-conditioned at the place of the discharge; and they also covenant to equip the ship complete and adequate to the voyage. The charterer is bound to furnish the cargo at the place of lading, and to take delivery at the port of discharge within specified periods called lay days; and penalties are annexed to enforce the reciprocal covenants.

Char'teris, Archibald Hamilton, Scottish clergyman: b. Wamphay, Dumfriesshire, 13 Dec. 1835. He was educated in the University of Edinburgh, where in 1808, after holding two Presbyterian pastorates, he became professor of biblical criticism. In 1898 he was made professor emeritus. Since 1901 he has been chaplain-in-ordinary to King Edward VII. He has published 'Life of Professor James Robertson' (1863); 'Canonicity' (1881); 'The Christian Scripture' (1888).

Charters Towers, Australia, a mining township of Queensland, on the northern spurs of the Towers Mountain, 820 miles northwest of Brisbane. The place was first settled in 1871–2, when gold was discovered there. In 1877 it was incorporated as a town. Now it has railway connection with the coast by means of a railroad to Townsville. The yield from the gold fields, up to 1891, was 2,300,000 ounces. Pop. (1891) of the town, 4,597; of the field, 14,129.

Chartier, kär-tē-ā, **Alain,** French poet and moralist: b. Bayeux about 1392; d. about 1440. He was educated at the University of Paris, and was appointed by Charles VI. clerk, notary, and secretary of the royal household — posts which he held under Charles VII. His contemporaries considered him the father of French eloquence. Although far from handsome it is said that he received one day while asleep a kiss from Margaret of Scotland, wife of the dauphin, who explained her conduct to the surprised bystanders by saying that it was not the man she kissed, but the mouth whence flowed so many golden words. His poems are often graceful and nervous, and his vigorous prose contains many fine thoughts and prudent maxims. The first edition of his works which bears a date is that of 1489; the most esteemed that of 1617.

Chartism, a working-class movement in England, 1838–48, the primary purpose of which was the attainment of certain political reforms. The Reform Bill of 1832 had failed to bring the expected advantages to the working class; the new poor law of 1835 was unpopular; and a period of general commercial depression and a succession of bad harvests had increased the sufferings of the people. The discontent resulting found definite expression in the «Charter» or «People's Charter» prepared in 1838 by a committee of six members of Parliament and six working-men. It comprised six heads, (1) Universal suffrage, or a right of voting conferred on every male of 21 years of age, of sound mind, unconvicted of crime, and a native of the United Kingdom, as well as to every foreigner possessing the same qualifications, who had been resident in the United Kingdom for more than two years; (2) equal electoral districts; (3) vote by ballot; (4) annual parliaments; (5) no other qualification to be necessary for members of Parliament than the choice of the electors; (6) members of Parliament to be paid for their services.

At first a portion of the middle class supported the movement, but they became estranged, and the Chartists became more and more a distinctively working-class party. The movement was not purely political; it was of a distinctively social nature, and aimed at the improvement of general social conditions. Stephens, one of the leaders, is quoted as saying «Chartism is no political movement where the main point is gaining the ballot. . . . The Charter means a good house, good food, prosperity, and shorter working hours.» Immense meetings were held throughout the country, numbering sometimes upward of 100,000, and popular excitement was great. Physical force was advocated by some as the only effectual means for the masses to obtain their demands. An association called the National Convention was embodied, and commenced its sittings in Birmingham in May 1839. In June of the same year a petition in favor of the charter was presented to the House of Commons, which refused to take it into consideration. The feeling of exasperation among the Chartists increased, and in November a riot took place at Newport, in which 10 persons were killed and great numbers wounded. The year 1842 was the time of the most excitement; great riots took place in the northern and midland districts of England, and these, though not directly caused by the Chartists, were more or less connected with the movement, and the party was blamed for them. In 1848 a great demonstration took place in London, but the precautions taken by the government in enrolling special constables and making other preparations for defense frightened the leaders, and from that time Chartism rapidly declined.

Bibliography.— McCarthy, 'History of Our Own Times'; Carlyle, 'Chartism'; Gammage, 'History of the Chartist Movement'; Engels, 'Condition of the Working Class in England in 1844'; Hyndman, 'Historical Basis of Socialism in England.'

Chartran, shär-träṅ, **Théobald,** French painter: b. Besançon 21 Jan. 1849. He studied under Cabanel, and obtained the grand prix de Rome in 1877. He has painted mostly historical pictures or portraits; among his works are 'The Body of Monseigneur Darboy lying in state in the Palace of the Archbishop of Paris'; 'Angelica and Roger'; 'Vision of Saint Francis of Assisi'; 'Capture of Rome by the Gauls'; and several portraits of which the best are those of Mounet-Sully as Hamlet, Sadi Carnot, and Leo XIII.

Chartres, shärtr, **Robert Philippe Louis Eugène Ferdinand D'Orleans,** Duc de, grandson of Louis Philippe: b. Paris 9 Nov. 1840. When only two years old he lost his father, and six years later the Revolution drove him, along with his family, into exile. The young duke was brought up in England, and joined the Union army in the first campaign of the American Civil War, in 1862. He married, 11 June 1863, Françoise Marie Amelie d'Orleans, eldest daughter of the Prince de Joinville.

Chartres, shärtr (anciently Autricum, Civitas Carnutum), France, capital of the department Eure-et-Loire, 49 miles southwest of Paris, situated on the slope of a hill, at the foot of which flows the Eure, and partly enclosed by walls and ditches, surrounded by ramparts planted with trees, which form an agreeable promenade. Most of the houses are built of wood and plaster, and have their gables toward the street. The streets of the lower town are narrow and crooked, and so steep in some parts as to be inaccessible to carriages. There are several public squares, one of which is of great extent. The only public buildings of note are the cathedral, the church of St. Pierre, contiguous to a huge barrack, once a Benedictine abbey; and the obelisk to the memory of Gen. Marceau. The cathedral, one of the most magnificent in Europe, is rendered conspicuous by its two spires, one of which is 403 feet high, surmounting the hill on which the city stands. It has 130 windows filled with painted glass of admirable workmanship; and in its chair Henry IV. was crowned in 1594. Chartres is the seat of a bishopric, communal college, seminary, and agricultural society; and has two hospitals, a cabinet of natural history, botanical garden, and a public library. Toward the end of the 11th century it was fortified, and in 1145 St. Bernard preached, in its cathedral, the second crusade. Pop. (1896) 19,213.

Chartreuse, shär-trėz, the French term for a Carthusian monastery, corresponding to the Italian Certosa. The order of the Carthusians (q.v.) was not very ascetic in its rules, and each monk was allowed a decent cell and a garden of his own, so that the monasteries had often architectural character. The famous monastery called La Grande Chartreuse is the original and supreme monastery of the order, and exists in the mountains not far from Grenoble in eastern France. Of the monastic buildings still existing, none is architecturally noble, and nearly all are of date later than the middle of the 17th century. Therefore it does not rank with the great show-places of monasticism for the grandeur and splendor of its buildings, but has ever attracted travelers, curious or serious, as being the home of the most authentic exemplars of primitive monasticism in its rigor. At the Revolution the whole establishment was confiscated, the monks being driven out and secularized or banished. But in 1816 the order of Carthusians was permitted again to occupy the buildings, as tenants of the state, at a nominal rent. They were again expelled from their ancient home by the government of the French republic in 1903 under the laws for suppression of religious houses. When the monks were this time dispossessed the entire rural population of the vicinity, who had all their lives experienced the large, wise beneficence of the monks in supporting the local hospitals, schools, churches, and the like, with their lives would have defended their benefactors against the power of the government had not the Carthusians counseled patience and forbearance. Till this second ejection from their home the monks used to derive a revenue from the sale of certain medicinal agents prepared in their laboratories which enjoyed a high reputation; in particular, the cordial liqueur Chartreuse. The other preparations were an elixir and a salve.

Chartulary, kär'tū-lā-rĭ, a collection of charters. When any body, ecclesiastical or secular, came to be possessed of a considerable number of charters, it has been customary for convenience and safety to have them classified and copied into a book or roll. Such book or roll has generally received the name of a Chartulary. Mabillon traces Chartularies in France as far back as the 10th century, and some authorities say that Chartularies were compiled even still earlier; but it was not till the 12th and 13th centuries that Chartularies became common. They were kept by all kinds of religious and civil corporations, but also by private families. Many of them have been printed, and their contents generally are of the greatest value in historical, archæological, and genealogical inquiries. The name is in Scotland applied to the record of feu-charters kept by the superior's law-agent. Copies of valuable historical documents, whose originals have been lost, have been found in chartularies.

Charybdis, kă-rĭb'dĭs, an eddy or whirlpool in the Straits of Messina, celebrated in ancient times, and regarded as the more dangerous to navigators because in endeavoring to escape it they ran the risk of being wrecked upon Scylla, a rock opposite to it. There are several whirlpools in this region which may have been dangerous enough to the undecked boats of the Greeks, but none which the modern navigator with due caution may not easily pass. The name comes from the mythological story of Charybdis, the daughter of Poseidon and Gæa, whom Zeus, on account of her anger, hurled into the sea, where she became a whirlpool and swallowed up every ship that approached. This whirlpool is now called Calofaro and La Rema.

Chas'ca, the name under which the ancient Peruvians adored the planet Veneus.

Chase, Ann, American patriot: b. Ireland 1809; d. Brooklyn 24 Dec. 1874. She came to the United States in 1818; settled in New Orleans in 1832; removed to Tampico, Mex., in the following year, where she married Franklin Chase, United States consul, in 1836. During the war with Mexico, in the absence of her husband, she remained at the consulate to protect the American records. On one occasion a mob attempted to pull down the American flag floating over the consulate, but she protected it with drawn revolver, and declared that the flag should not be touched except over her dead body. Later through her efforts the city of Tampico was taken.

Chase, F. H., English biblical scholar: b. 21 Feb. 1853. He was educated at Christ's College, Cambridge, took orders in the English Church and was successively curate of Sher-

borne, Dorset, 1876–9, and St. Michael's, Cambridge, 1879–84. He was lecturer in theology at Pembroke College 1881–90, and at Christ's College 1893–1901, and has been principal of the Clergy Training School at Cambridge from 1887, Norrisian professor of divinity from 1901, and president of Queen's College from the last named year, also. He has published 'Chrysostom' (1887); 'The Lord's Prayer in the Early Church' (1891); 'Old Syriac Element in Codex Bezæ' (1895); 'Syro-Latin Text of the Gospel' (1897); 'Credibility of the Book of Acts' (1901).

Chase, George, American lawyer: b. Portland, Me., 29 Dec. 1849. He graduated valedictorian at Yale in 1870, and at Columbia Law School in 1873. He was assistant professor of municipal law at Columbia University 1874–8; professor of criminal law, torts and procedure 1878–91; member of the university council 1890–1. In 1891 the New York Law School was chartered through his efforts, and he was chosen its dean, a position he still holds. Publications: 'The American Student's Blackstone' (1876); editor of 'Ready Legal Adviser' (1881); of Stephens' 'Digest of the Law of Evidence' (1886); 'N. Y. Code of Civil Procedure'; Chase's 'Cases on Torts.'

Chase, Philander, American Protestant Episcopal bishop: b. Cornish, N. H., 14 Dec. 1775; d. Jubilee College, Ill., 20 Sept. 1852. He graduated at Dartmouth College in 1795, and was ordained priest by Bishop Provoost 10 Nov. 1799. After missionary work in New York State, and rectorships at New Orleans, La., and Hartford, Conn., he set out as a missionary in districts west of the Alleghanies. In Ohio he organized various parishes, and in 1819 was consecrated the first bishop of Ohio. Between 1821 and 1831 he was for two years president of Cincinnati College, but chiefly engaged in perfecting plans for a theological seminary. He visited England, and through the influence of Lord Gambier and Lord Kenyon raised a large sum of money, $30,000, with which he founded the Theological Seminary and Kenyon College, at Gambier, Ohio. In 1831 he resigned his bishopric and the presidency of the college and seminary, removed to Michigan 1832, was chosen bishop of Illinois 1835; again visited England and raised $10,000 with which he founded Jubilee College, Peoria County, Ill. Upon the death of Bishop Griswold in 1843, Bishop Chase became presiding bishop of the Church. "He was abundant in labors; indefatigable in zeal." He wrote: 'A Plea for the West' (1826); 'The Star in the West, or Kenyon College' (1828); 'Defense of Kenyon College' (1831); 'A Plea for Jubilee' (1835); 'Reminiscences: An Autobiography' (1844).

Chase, Pliny Earle, American scientist: b. Worcester, Mass., 18 Aug. 1820; d. Haverford, Pa., 17 Dec. 1886. He graduated at Harvard, 1839; taught in Philadelphia and engaged in business for many years, but employed his leisure in physical and philological studies. In 1864 the Magellanic gold medal of the American Philosophical Society was awarded him for his 'Numerical Relations of Gravity and Magnetism.' The results of other mathematical and physical researches were published from time to time in the 'Proceedings' of the American Philosophical Society, and brought him a wide reputation, both in the United States and abroad, as a man of unusual scientific powers and attainments. In 1871 he became a member of the faculty of Haverford College, Pa., and for a long time was professor of philosophy and logic. He published 'Elements of Meteorology' (1884).

Chase, Salmon Portland, American jurist: b. Cornish, N. H., 13 Jan. 1808; d. New York 7 May 1873. He was the son of Ithamar Chase, a farmer, and was, on his mother's side, of Scotch descent. At the age of nine he lost his father and later came under the care of his uncle, Philander Chase (q.v.), Bishop of Ohio, attended his uncle's school and working on the farm in Worthington. In 1822 he removed with his uncle to Cincinnati, returning soon after to New Hampshire, where he entered Dartmouth College, graduating in 1826. For three years he taught school in Washington, D. C., studied law under William Wirt, and in 1830 went to Cincinnati, where he began the practice of law. He soon made his influence felt as a lecturer, as publisher of the laws of Ohio (a work which insured his standing as a lawyer even if it did not reward him financially) and as a historian. His historical work was only a sketch, but it called attention to the importance of the study of the Ordinance of 1787. In 1834 Chase was married; he had five children, most of whom died in youth. His daughter, Kate Chase Sprague, handsome, brilliant and of great force of character, is in some respects one of the most remarkable women in our history. She was, in a large sense, her father's political manager and used every effort to secure his nomination to the presidency in 1864. Neither she nor her father saw anything incongruous in this, although the latter was at the time President Lincoln's secretary of the treasury. Chase, early in his career, identified himself with the anti-slavery movement. His advice and aid as a lawyer were frequently asked and never refused, his defense of the fugitive slave, Matilda, being one of his most notable efforts in this direction. Another celebrated case was that of the Kentucky farmer, Van Zandt, the original Van Tromp in 'Uncle Tom's Cabin.' Chase appeared for the defendant in 1842, and after an appeal to the supreme court of the United States, the case was argued before that tribunal by Chase and William H. Seward. Chase was an abolitionist, not of the school of William Lloyd Garrison, but that of James G. Birney. He maintained that Congress could not rightfully place on State officials the obligation of enforcing the Fugitive Slave Law. His attitude toward slavery, by a strange combination of circumstances, made him United States senator, in 1849. In the legislature which elected Chase two Independents held the balance of power. They united with the Democrats, making the necessary 55 votes. This coalition did not compromise Chase in his subsequent career in the Senate, as his election was practically forced upon the Democrats. In the Senate he continued his opposition to slavery, during the stormy scenes of the period of compromise in 1850, and was severe in his attitude toward Clay's position.

During Chase's term of office the Republican party, composed largely of opponents of the

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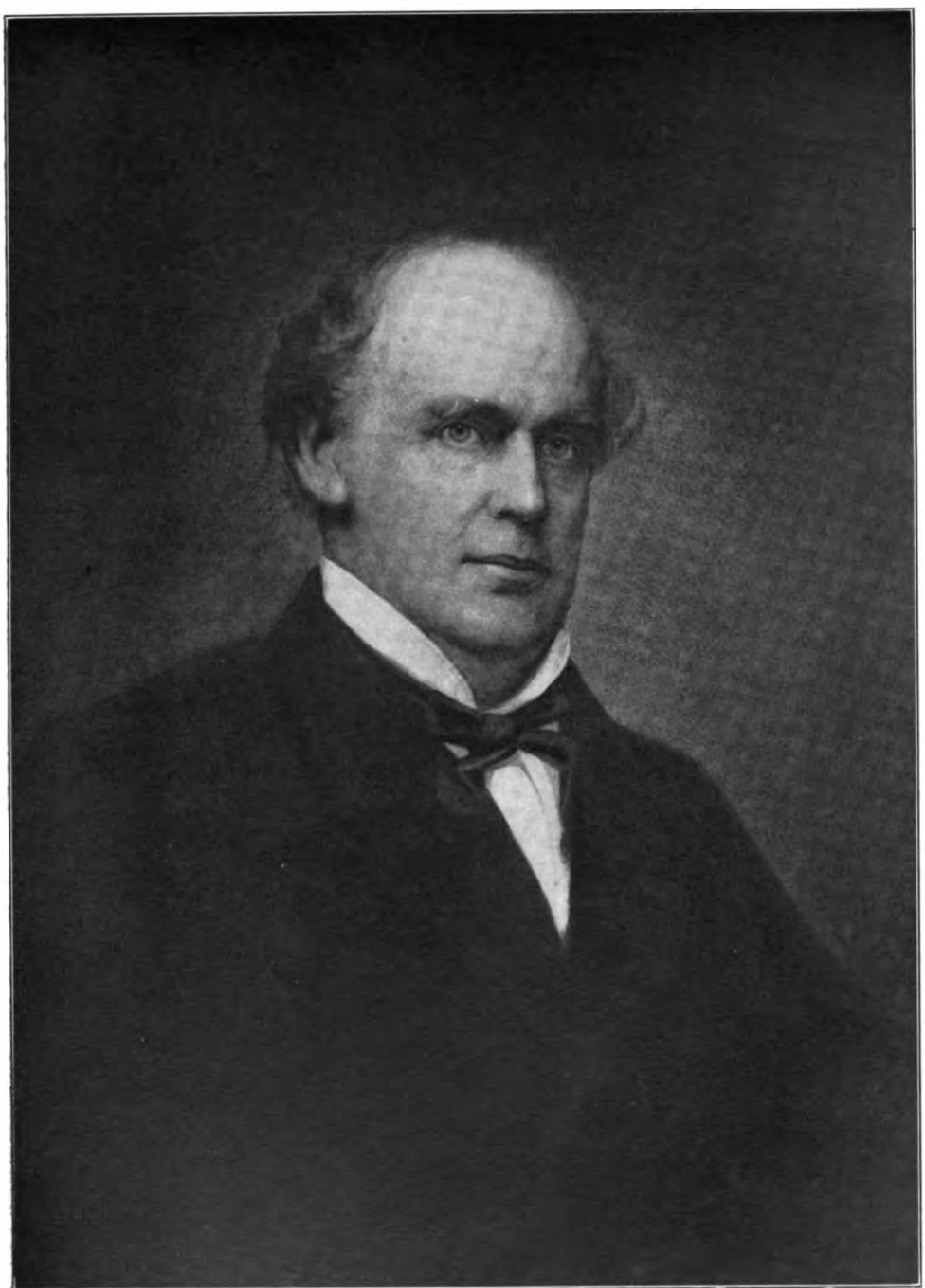

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SAMUEL PORTLAND CHASE.

CHIEF JUSTICE OF THE UNITED STATES SUPREME COURT, 1864-1873

Non

Kansas-Nebraska bill, was being formed, and Chase early identified himself with it. By this party he was nominated as governor of Ohio and in 1855 was elected, and re-elected in 1857. He was still the negro's friend, and some of his acts as governor in connection with this aspect of his administration have been freely criticised. Chase was a prominent candidate for the Republican nomination for the presidency in 1860, but was destined to see the votes of his own State nominate Abraham Lincoln. He became Lincoln's secretary of the treasury, a position which he filled during the four years of the Civil War. The national banking system, practically as it exists today, is to be attributed to his influence. On four or five different occasions Chase offered his resignation, but Lincoln repeatedly declined to relieve him of his post. Upon the death of Chief Justice Taney in 1864, President Lincoln appointed Chase to the vacant office, which he filled till the time of his death. When the question arose of a presidential nomination by the Democratic party, he defined his changed attitude in the following words: "I can not approve in general what the Republican party has done. I hold my old faith in universal suffrage, in universal amnesty, and in inviolate public faith; but I do not believe in military government for American States." His position was not altogether indefensible, for he was in all essentials, except his convictions on the slavery question, a Democrat of the school of Jackson and Benton. Chase loved his friends and aided them whenever opportunity offered. His only intimate personal friend among the public men of his own age, was Charles Sumner. Chase lacked that comprehension of the common people that so strongly characterized Lincoln. His attitude toward Lincoln doubtless accounts for some of his unpopularity, but in all his public acts he was honest and sincere. See Schucker's 'Life and Public Services Salmon P. Chase' (1874).

Chase, Samuel, American jurist: b. Somerset County, Md., 17 April 1741; d. 19 June 1811. His father, a learned clergyman, instructed him in the classics; later he studied law at Annapolis, being admitted to the bar at the age of 20. Having become a member of the colonial legislature, he distinguished himself by his bold opposition to the royal governor and the court party. He took the lead in denouncing and resisting the Stamp Act, and became a most active adversary of the British government in his State. The Maryland Convention of 22 June 1774 appointed him to attend the meeting of the General Congress at Philadelphia in September of that year. He was also present and conspicuous in the subsequent Congresses during the most critical periods of the Revolutionary War. That of 1776 deputed him on a mission to Canada along with Dr. Franklin, Charles Carroll of Carrollton, and the Rev. John Carroll. He signed the Declaration of Independence without hesitation. In June 1783 the legislature of Maryland sent him to London as a commissioner to recover stock of the Bank of England, and large sums of money which belonged to the State. In 1791 he accepted the appointment of chief justice of the general court of Maryland. Five years afterward President Washington made him an associate judge of the supreme court of the United States. Political cases of deep interest having been tried when he presided in the circuit courts, and his conduct having given much displeasure to the Democratic party, he was impeached by the national House of Representatives. The trial of the judge before the Senate is memorable on account of the excitement which it produced, the ability with which he was defended, and the nature of his acquittal. He continued to exercise his judicial functions with the highest reputation till 1811, in which year his health failed.

Chase, Thomas, American educator: b. Worcester, Mass., 16 June 1827; d. Providence, R. I., 5 Oct. 1892. He was a brother of Pliny E. Chase (q.v.). In 1855 he became professor of philology and classical literature at Haverford College, near Philadelphia; in 1875 its president. Among his publications are: 'Hellas: Her Monuments and Scenery' (1861); an address on 'Liberal Education: Its Aims and Methods.'

Chase, William Henry, American military officer: b. Massachusetts 1798; d. Pensacola, Fla., 8 Feb. 1870. He was graduated at the United States Military Academy, became first lieutenant of engineers in 1819, captain in 1825, and major in 1838. He was engaged in repairing Fort Niagara in 1817–18; as superintending engineer for many important works in 1819–28; and had charge of the defenses in Pensacola harbor, Fla., 1828–54. He superintended the improvements of Mobile Bay; as senior engineer officer had charge of all the fortifications and river and harbor improvements at the mouth of the Mississippi; and took an influential part in all projects connected with the development of the region around Pensacola. At the outbreak of the Civil War he entered the Confederate army, and was prominent in the seizure of the Pensacola navy yard.

Chase, William Merritt, American artist: b. Franklin, Ind., 1 Nov. 1849. He studied painting in oil at the National Academy in New York and subsequently in Europe with Piloty. He has made a specialty of portraits and figure pieces, winning celebrity with 'Ready for the Ride,' 'The Apprentice,' and 'The Court Jester,' and portraits of American ladies. He was appointed instructor at the Brooklyn Art School in 1881 and elected a National Academician in 1890. In 1896 he conducted an art class to Madrid.

Chasidim, kă-sē'dĭm, or **Pietists,** the name of a Jewish sect which appeared in the middle of the last century. Its adherents are strongly inclined to mysticism, depreciate the Old Testament and its ordinances, and deem themselves able to approach the Source of Light by means of a virtuous life, prayer, and secret meditation. They have a great esteem for the Hogadas of the Talmud, the books of the Cabbala, and the writings of their own teachers, which are full of tales, extraordinary cures, and mystic interpretations, but also contain excellent moral precepts. The founder of the sect was Israel of Podolia, surnamed Baalschem (contracted into Bescht), from his supposed influence with God and the spiritual hosts, whom he could move by his prayers and amulets to grant whatever he desired. At the head of the sect are three superiors or Zaddiks, each of whom has a particular diocese or district allotted to

him, and jurisdiction over all the Chasideans resident within it. They are most numerous in Russian Poland, Moldavia, Wallachia, and some parts of Galicia and Hungary, and are regarded with great antipathy by the orthodox Jews. Chasidim is also the name given to a sect which sprang up about the second century B.C. This party is credited with the origin of the revolt of the Maccabees, with combating the erroneous notions bred among the Jews by the study of Grecian philosophy, and with being the parent stock of the Pharisees. See JEWISH SECTS.

Chasing, the art of cutting artistic or ornamental designs on metals. Figures on metal are often produced in relief by being punched out from behind, and sculptured or finished on the front with small chisels and gravers. It is this latter process that is properly called chasing, and the same term is applied to designs produced by hand-tools on more or less flat surfaces.

Chasles, Michel, mē-shĕl shäl, French engineer: b. near Chartres 15 Nov. 1793; d. Paris 18 Dec. 1880. He entered the École Polytechnique in 1812, and on leaving was classed among the engineers; but with rare generosity he renounced his place as an officer in order to assure a career to one of his unsuccessful comrades. In December 1829 he addressed to the Brussels Academy a memoir on two general principles of geometry, duality and homography. The introduction to this memoir expanded into the well-known 'Historical View of the Origin and Development of Method in Geometry,' the first edition of which was published in 1837. In 1841 he was appointed to the chair of Machines and Geodesy at the École Polytechnique, and in 1846 to that of Higher Geometry, which had just been instituted at the Sorbonne. Some of his published works are: 'Treatise on Higher Geometry' (1852); 'The Three Books of Euclid's Porisms Re-established for the First Time' (1860); 'Treatise on Conic Sections' (1865); 'Reports on the Progress of Geometry' (1870). These, his principal works, are geometrical and historical. His contributions to the 'Comptes Rendus' of the Academy of Sciences and to other scientific publications are extremely numerous, and though in the main geometrical, are not exclusively so. In particular he treated in several memoirs the question of attraction, and gave the first synthetic demonstration of a celebrated theorem of Maclaurin on the attraction of ellipsoids. Two of his memoirs on the properties of cones of the second degree, and on the spherical conics, were translated into English, and published, with additions, by Charles Graves in 1841. During his long life he was the recipient of many scientific distinctions, and he will always be cited as one of the great geometers of the present century.

Chasles, Victor Euphémion Philarete, French critic: b. Mainvilliers, near Chartres, 8 Oct. 1798; d. Venice, 18 July 1873. The son of a Jacobin, and educated according to Rousseau, he acquired the point of view which, enlarged by life abroad, makes his essays so unique and instructive. He has written in every imaginable prose form, from a romance to a riddle; but his enduring work is contained in 'French Language and Literature from the Beginning of the Sixteenth Century to 1610' (1828); 'Studies of Antiquity' (1847); 'Studies of the Sixteenth Century in France' (1848); 'Journeys of a Critic Through Life and Books' (2d series, 2d ed., 1866-8); and 'Memoirs' (1876-8).

Chassaignac, shă-sān-yăk, **Charles Louis,** American physician: b. New Orleans, 5 Jan. 1862. He was graduated at the medical department of the University of Louisiana; and was president and Professor of Genito-Urinary Diseases at the New Orleans Polyclinic in 1902. He was editor of the 'New Orleans Medical and Surgical Journal'; president of the Orleans Parish Medical Society; vice-president of the Louisiana State Medical Society; one of the founders and president of the New Orleans Sanitarium and Training School for Nurses; etc.

Chassé, shä-sā', **David Hendrik,** BARON, Dutch soldier: b. Thiel in Guelders 18 March 1765; d. Breda 2 May 1849. He began his military career when but 10 years of age; became lieutenant in 1781, and captain in 1787. After the failure of the revolutionary movement he took French service; was appointed lieutenant-colonel in 1793; and two years later found himself marching toward the Netherlands under the command of Pichegru. He afterward fought with the French in Germany and Spain, gaining great distinction, and from Napoleon himself, because of his fondness for bayonet charges, the name of "Général Baïonette." He was made a baron by Louis Bonaparte in 1809. As lieutenant-general of the Dutch forces, in 1815, Chassé did good service at Waterloo against his old comrades, the French. As governor of Antwerp he covered himself with glory by his heroic three-weeks' defense of the citadel with 5,000 men against 60,000 Belgians and French (1832).

Chassepôt, Antoine Alphonse, äṅ twäṅ ăl-fôṅs shäs-pō, French inventor: b. 4 March 1833. He was an employee in the Paris arsenal of St. Thomas, where he became an official in 1858, and in 1863 brought before the government the model of his breech-loading rifle, adopted three years afterward, and subsequently abandoned. It was about four pounds lighter than the needle-gun and about one pound lighter than the Martini-Henry rifle.

Chassepot (shäs-pō) **Rifle,** a breech-loading rifle, named after its inventor, and adopted as the firearm of the French infantry in 1866, after the value of the Prussian needle-gun had been shown in the war between Prussia and Austria. It is not now in use, having been replaced in the French army by a much modified form of small-arms. It belonged to the same system as the needle-gun, but was believed to have sundry advantages over that weapon. It was considerably lighter than the needle-gun, the weight of the latter being 12 pounds, and that of the former less than nine pounds. In accuracy, penetrative power, length of range, lowness of trajectory, and rapidity of fire, it was inferior to the Martini-Henry. To the needle-gun it was superior in length of range and lowness of trajectory, as was shown in the war of 1870, in which the French could open fire at the distance of 1,500 paces, while the effective range of the needle-gun was only 400 to 500 paces. This superiority, however, was neutralized by the fact that its lightness and

its large charge had the effect of producing great recoil and of heating the barrel. At the commencement of an action the men would open fire at long ranges, but before closing with the enemy the barrel of their piece was so heated that the weapon could hardly be handled. From the recoil and heating combined, the soldier was obliged to fire from the hip, so that his aim was not accurate; while after much firing the breech became clogged.

Chasseur, shä-sėr, a male attendant upon persons of distinction, attired in a military dress, and wearing a sword. It is also the name given by the French to bodies of light infantry which act as skirmishers and sharpshooters. The name was originally given to some troops raised in 1815, in imitation of the Jägers of the Austrian army, who were chiefly Tyrolese chamois-hunters, and unerring marksmen. The French Chasseurs are of two kinds, light cavalry and infantry. Every battalion of infantry has a company of Chasseurs, but the term is more particularly applied to that body of men called the Chasseurs de Vincennes, who were enrolled and armed with rifles in 1833, and quartered at Vincennes. The Chasseurs of the Italian army are called Bersaglieri. Garibaldi's Chasseurs, that took a prominent part in the Italian war of 1859, and in the campaign against Francis II. of Naples, in 1860, were known as Cacciatori dei Alpi, or Alpine hunters.

Chastelard, Pierre de Boscobel de, pē ār dė bōs'kōbĕl shät-lär, French poet: b. Dauphiné 1540; d. 1563. He fell madly in love with Mary Stuart at the French court, and poured forth his admiration in innumerable poems. He figures as one of her escort on her return to Scotland after the death of her husband (1561). He had to return to France after this pleasing duty was performed, but on the first opportunity he was again in Scotland (1562). Mary gave him a very gracious welcome, answered, it is said, a poem dedicated to her, and allowed him to accompany her singing with his flute. Chastelard had the temerity one night to invade the royal bed-chamber. He was discovered, and ordered by the queen to quit the kingdom. Shortly after, however, he again concealed himself in a recess in her bedroom at Burntisland. For this offense he was tried publicly at St. Andrews and forthwith hanged, the queen resisting all appeals for pardon.

Chastelard, a tragedy published in 1869, by Algernon Charles Swinburne, the scene of which is laid at Holyrood Castle, during the reign of Mary Queen of Scots. The tragedy is conspicuously one to be read, not acted. It is too long, too much lacking in action, and of too sustained an intensity, for the stage. The style is essentially lyric, full of exquisite lines and phrases; and as a whole, the play presents an intense passion in a form of adequate beauty.

Chasteler, shät-lā, **Jean Gabriel,** MARQUIS OF: b. 1763; d. Venice 7 May 1825. He was grandee of Spain of the first rank, Austrian master of ordnance or general of artillery, military governor of Venice, and descended in a collateral line from the dukes of Lorraine. He received his first education at Metz in the Collége de Fort. In 1776 he entered the Austrian service. After having served against the Turks, by whom he was severely wounded, he displayed his zeal for the house of Austria in the disturbances in the Netherlands. In 1796–7 he was employed in the negotiations of his court in Poland and Russia; was afterward with Suwaroff in Italy, where he distinguished himself in several engagements with the French armies. In 1808, with Hormayr, he was the soul of the famous insurrection in the Tyrol, and all the political as well as military events which were connected with it. Napoleon, enraged at the surrender of 8,000 French and Bavarians at Innsbruck, issued a proclamation at Enns, in which "a certain Chasteler who calls himself a general in the Austrian service, but who is the leader of a band of robbers, and the author of the murders committed upon the French and Bavarian prisoners, as well as the instigator of the Tyrolese insurrection," is declared an outlaw, and ordered to be brought before a court-martial and shot within 24 hours. The Emperor Francis commanded that an order which violated all international laws, and which was the more censurable as Chasteler had taken particular care of the prisoners and the wounded, should be met by retaliation. The Bavarian army, under the command of the marshal-duke of Danzig, entered Tyrol. Chasteler fearlessly encountered it, but his army was routed 13 May. After the close of the war he received several appointments, and in December 1814 was made governor of Venice.

Chastelet, shät lā, **Gabrielle Emilie Breteuil,** brė-tė-yĕi, MARQUISE DU: b. Picardy 1706; d. Lunéville 1749. She was of an ancient family, was taught Latin by her father, Baron Breteuil, and was well acquainted with that language, but her favorite study was mathematics. She had a sound judgment and much taste, loved society and the amusements of her age and sex, but after the publication of the 'Philosophical Letters' by Voltaire had roused the Jesuits' criticism against him, she abandoned all these pleasures, and in 1733 retired with him to the dilapidated castle of Cirey, situated in a dreary region on the borders of Champagne and Lorraine. She embellished this residence, formed a library, collected instruments, etc. Cirey was often visited by the learned,—by Maupertuis, John Bernouilli, etc. Here the marchioness learned English of Voltaire in the space of three months, and read with him Newton, Locke, and Pope. She also wrote an analysis of the system of Leibnitz, and translated Newton's 'Principia' with an algebraic commentary. Voltaire lived six years with her at Cirey, where they employed their time in the study of science, and in getting up lovers' quarrels for the pleasure of patching them up again. At the end of this time she went to Brussels to prosecute a lawsuit, which was terminated by an advantageous compromise, brought about by Voltaire. She also carried on a correspondence with the German philosopher, Wolf, until her death. Her 'Traité de la Nature du Feu' obtained the prize of the Parisian Academy of Sciences, and is published in their collections. Her husband, the Marquis du Chastelet Lomont, was high-steward of King Stanislaus Lesczinsky at Lunéville.

Chastellux, François Jean, fräṅ swȧ zhŏṅ shät lüks, **Chevalier de,** French historian: b. Paris 1734; d. Paris 28 Oct. 1788. He entered the army in 1749; distinguished himself as colonel in the Seven years' war, and later served in the American Revolution as major-general under Rochambeau, and gained the friendship of Washington by his amiable character. He published numerous works relating to the United States, including 'Voyage dans l'Amerique septentrionale dans les annees, 1780–1782'; 'Discours sur les avantages et les dessavantages qui resultent pour l'Europe de la decouverte de l'Amerique'; and translated into French David Humphry's 'Address to the Army of the United States.'

Chasuble, chās'ū-bl, the outermost vestment worn by a priest in celebrating the mass: its name in Latin is *casula,* dim. of *casa,* house. In its original form it was a garment of circular or elliptical form like the South American *poncho,* with an opening in its centre through which the head of the wearer passes. But the form of chasuble now employed almost universally consists of a more or less oval front and back joined at the top, where is an opening to allow the head to pass through. The garment is usually of silk embroidered and decorated with gold or silver thread, and with a cross on the back. Chasubles of different colors, white (or cloth of gold) red, violet, green, black, are worn according to the occasion; as white on all high festivals, violet in penitential times, red on the anniversaries of martyrs, black in masses for the dead, etc. In the present form of the chasuble the priest's arms are free, whereas in the ancient form, the garment covered the person like a cloak.

Chat, a name given to various small passerine birds, chiefly of the genera *Saxicola* and *Icteria;* generally used with a prefix. The yellow-breasted chat (*Icteria virens,* with the western variety *longicauda*) is an aberrant member of the family of wood-warblers (*Mniotiltidæ*), from the typical members of which it differs in its large size, robust build and stout bill. The sexes are similarly colored, being bright olive-green above, brilliant yellow on the breast and white on the belly, the sides of the head black with white markings. It is an abundant bird in thickets in the United States as far north as the latitude of Massachusetts, is migratory, and chiefly remarkable for its exceeding volubility and the incongruous admixture of sounds, natural and mimicked, of which its song consists. During the mating season the males indulge in the most extravagant aërial antics while singing, and often sing at night. See STONE-CHAT.

Chatard, shä-tär, **Francis Silas Mareau,** American Roman Catholic prelate: b. Baltimore 1834. He was graduated at Mount Saint Mary's and at Saint Urban College, Rome, being ordained to the priesthood in 1863. He became rector of the American College in Rome and in 1878 bishop of Vincennes. He has written 'Christian Truths.'

Château-Gaillard, gī-yär, a feudal fortress in France, near Les Andelys (Eure), built by Richard Cœur de Lion in 1197. As late as the 15th century it was considered one of the strongest fortresses in Normandy. Its picturesque situation on a high cliff 300 feet above the Seine has made it a favorite subject for artists. Turner has represented it in two of his pictures. See ANDELYS, LES.

Chateau-Gontier, shä tō gŏṅ-tē-ā, France, a town in the department of Mayenne, 19 miles south-southeast of Laval, on the Mayenne, here crossed by a stone bridge, connecting the town with its principal suburb on the opposite side. Its houses are well built, but the streets are irregularly laid out. It has a court of first resort, an agricultural society, and communal college; and linen and serge manufactories, bleachfields, tanneries; with some trade in clover seed, linen, thread, iron, wood, wine, etc. Pop. (1896) 7,227.

Chateau-Lafitte, lä-fēt, **Chateau Latour,** and **Chateau Margaux,** famous vineyards, all in the department of the Gironde, France, furnishing the best of the red wines of Bordeaux. See BORDEAUX WINES.

Château-Thierry, tē-ȧr-rē, France, a town in the department of Aisne, on the right bank of the Marne, 38 miles south-southwest of Laon. It occupies the side of a hill, whose rocky summit is crowned by the ruins of the old castle of Thierry, said to have been built by Charles Martel, in 730. It is the birthplace of La Fontaine (to whom a fine marble statue has been erected), and was the scene of several conflicts during the campaign of 1814. On 9 Sept. 1870, it was occupied by the Germans, and became a few days later the temporary headquarters of the emperor. It possesses a court of primary resort and a communal college, and has manufactures of linen and cotton twist, and a trade in grain, wool, and cattle. Pop. (1891) 6,863.

Châteaubriand, François Auguste, fräṅ swä ō-güst shä-tō-brē-äṅ, VICOMTE DE, French author and politician: b. St. Malo, Brittany, 4 Sept. 1768; d. Paris 4 July 1848. He received a commission in the army in 1788, and at the commencement of the Revolution he hurried into Paris to witness the great commotions then taking place there. In the spring of 1791 his ardent and enthusiastic spirit led him to join an expedition to America for the purpose of exploring its Arctic regions, and discovering the northwest passage. He crossed the Atlantic, landed at Baltimore, and proceeded to Philadelphia, where he had an interview with Washington. Returning to France in 1792 and married. Out of his American experience largely grew his 'Les Natchez' (see NATCHEZ, LES). He returned shortly after he quitted France and joined with other emigrants the Prussian army on the Rhine. At the siege of Thionville he was wounded in the thigh, and subsequently became an exile in England. Here his health gave way, and friendless and penniless he continued for a time to wear out a miserable existence in London. He at last found means of earning a subsistence by giving lessons in French and executing translations for the booksellers. In 1797 he published his 'Essai historique, politique et moral sur les Révolutions anciennes et modernes, considérées dans leurs Rapports avec la Révolution Française.' It was not intended with much success in England, and attracted no notice whatever in France. The essay is pervaded by a strong sceptical spirit in religious matters, but its author's views on this subject were soon to

experience a sudden and important change. The death of his mother in prison, and the accounts of her last moments transmitted to him by his sister, who herself was no more by the time her letter reached her brother, made a lasting impression on the mind of Châteaubriand, and he became a firm believer in Christianity. In 1800 he ventured to return to France and take up his abode under an assumed name at Paris. Encouraged by the success of an essay on literature, contributed to the 'Mercure,' he published in 1801 his 'Atala,' which was afterward introduced as an episode into his 'Génie du Christianisme.' In the following year appeared his celebrated work 'Le Génie du Christianisme,' which may be said to have caused a religious reaction, and inaugurated a new period in the social history of France. The object of Châteaubriand was to demonstrate the superiority of Christianity over all other religions in a poetic and artistic, as well as moral and beneficial point of view. Though a work more brilliant than profound, it is unsurpassed for beauty of language and description and the eloquence of its impassioned appeals. The main charm indeed of the book may be said to lie in its beautiful imagery, drawn from external nature, and more especially from nature as exemplified in the glowing scenery of the New World. In this respect Châteaubriand may be said to have revived in French literature the description of natural scenery and objects which had long been almost unknown. His work attracted the attention and admiration of Bonaparte, and in 1803 he was appointed French minister for the Republic of the Valais. This office he resigned in 1804.

In order to give life and tangible form to the theories propounded in the 'Génie du Christianisme,' he commenced 'Les Martyrs,' and to qualify himself for describing accurately the scenes amid which the poem is laid, made a pilgrimage to the East. In 1809 'Les Martyrs' was published, and is considered by many the best of his works. Some of the descriptions, such as the ancient forests of Gaul, the assemblies of the Christians in the catacombs, and the picture of Rome under the emperors, are given with marvelous beauty and effect. In 1811 appeared his 'Itinéraire de Paris à Jerusalem.' The restoration of Louis XVIII. was hailed by him with enthusiasm, and a pamphlet entitled 'De Bonaparte et des Bourbons,' published by him in 1814, was said by the king to have been worth to him an army of 100,000 men. On the second restoration he preserved the title of minister of state, but refused to take office along with Fouché. On the accession of Villèle to power Châteaubriand was appointed ambassador to Berlin, then to London, and in September 1822, crossed the Alps to represent France at the congress of Verona. In 1824 he was summarily dismissed from office at the instance of Villèle, and the indignation which he felt at such treatment made him join the ranks of the opposition, where in the columns of the 'Journal des Débats' he fulminated attacks against government. On the accession of the Martignac ministry he again returned to office, and proceeded as ambassador to Rome, but resigned this appointment on Polignac becoming premier. On the revolution of 1830 he refused to take the oath of allegiance to Louis Philippe, and consequently forfeited his seat in the house of peers and a pension of 12,000 francs. In 1831 a new work appeared from his pen, entitled 'De la Restauration, et de la Monarchie élective,' in which occurs the following singular avowal: "I am a Bourbonist by honor, a royalist by reason and conviction, and a Republican by inclination and character." In the same year he published his 'Études ou Discours historiques sur la Chute de l'Empire Romain,' a work exhibiting more of the imagination of the poet than the critical acumen of the historian. Owing to several pamphlets of a legitimist tendency issued by him, he was arrested in 1832, but defended by M. Berryer, and acquitted. In the latter years of his life he published an 'Essay on English Literature,' a literal prose translation of 'Milton's Paradise Lost,' and other works. His memoirs appeared after his death, under the title of 'Mémories d'outre Tombe.' They possess a great interest, and contain many charming passages, but are at times disfigured by the ebullitions of personal vanity, which formed one of the principal weaknesses of Châteaubriand. He was an intimate friend of the celebrated Madame Récamier, whose feeling toward him amounted almost to worship, and up to his last days he reigned supreme in her salon of the Abbaye-au-Bois, where all that was illustrious then came together.

Châteaudun, shā tō dėń, France, a town in the department of Eure-et-Loire, 26 miles south-southwest of Chartres, near the right bank of the Loire. Its streets are straight and terminate in a square, from which a complete view of the town may be obtained. The hôtel de ville and college buildings are deserving of notice. The old castle of the counts of Dunois overlooks the town. Châteaudun has manufactures of blankets, and large tanneries, and some trade in agricultural produce. In the Franco-German war the town was captured by the Germans (18 Oct. 1870), who held it till 9 November, when they were driven out by the French; it was, however, recaptured some few days after. Pop. (1891) 7,147.

Chateauguay (shăt-ō-gā') **River,** Lower Canada: operations on in the War of 1812; and battle of 25 Oct. 1813. (For the previous operations in the campaign against Montreal, see CHRYSTLER'S FARM.) Gen. Wade Hampton had been for some months in command at Burlington, Vt., when Wilkinson ordered him to advance on Montreal; ostensibly to co-operate with himself, though he had not yet started down the St. Lawrence. Hampton moved to the Canada line; then, finding that a drought had impaired the water supply on the straight road, marched westward to Chateauguay, N. Y., some 50 miles from the mouth of the Chateauguay River, an affluent of the St. Lawrence. He remained there three weeks, menacing the British communications and opening up his own, building roads, getting up supplies and artillery, etc. On 16 October Armstrong ordered him to approach the river-mouth for convenient junction with Wilkinson; and on the 22d-24th he established himself at Spear's, about 15 miles from the mouth. He had some 4,000 raw troops and 200 dragoons. Prevost had about 15,000 around Montreal, and the river lined with gunboats and batteries, while Hampton had not even

transports, and was in the heart of a hostile country. Prevost could have captured his whole army without much trouble; but he was really alarmed that Hampton was excellently posted to threaten the communications and supplies on the river. When Hampton advanced to Spear's, the British militia there retired; but Lieut.-Col. de Salaberry with 800 regulars intrenched himself in front on the road to the St. Lawrence, and filled the road with abattis. Hampton felt it needful to restore his communication with the river, and on the night of the 25th sent a strong flanking party around, while he himself attacked Salaberry in front. The former lost his way, and on this account he did not press his own attack. He lost 50 men, the British 25. Just then he received a message to prepare winter quarters; and feeling sure the campaign was to be abandoned, fell slowly back to Chateauguay, unmolested by Prevost. A week later he received a request from Wilkinson to send supplies forward and march down the river: he replied that he had none to send, and as Wilkinson evidently had not enough to sustain a forward movement, he should fall back to Plattsburg. Wilkinson received the message the day after his defeat at Chrystler's, and at once went into winter quarters.

Chateauneuf de Randon, shä-tō-nėf-dė-räṅ-dōṅ, France, a small town in the department of Lozère, 12 miles northeast of Mende, on a hill. It was formerly fortified, and is celebrated for the four years' siege sustained by the English garrison in 1380, against the troops of Charles V., commanded by the chivalrous Duguesclin. During this siege the English governor, who had been hard pressed, promised to surrender to Duguesclin at the expiration of 15 days, if no succor arrived. Before the end of the time agreed upon Duguesclin died, when his successor summoned the governor, who replied that he had given his word to Duguesclin, and would yield to no other. Informed of the hero's death, he said, "Then I will carry the keys to his tomb." Accordingly the governor sallied forth with the garrison to Dugueścclin's tent, and on his bended knees laid his sword and the keys of the town on the bier. In 1820 a simple commemorative monument was erected at the hamlet of Bitareile, on the spot where this event occurred. Pop. 3,541.

Châteauroux, shä-tō-roo, France, capital of the department of Indre, 144 miles south-southwest of Paris, in an extensive plain, left bank of the Indre. It has straight, broad, and tolerably well-paved streets, and spacious squares, with a public garden, and some fine promenades. The cloth manufactures, in which the wools of Berry are almost exclusively used, are extensive, employing about 2,000 workmen. Cotton hosiery, woolen yarn, tiles, paper, and parchment are also made; and there are tanneries and dyeworks. There is likewise a considerable trade in grain, wine, iron, wool, poultry, and cattle. The town owes its origin to a castle built in 950 by Raoul le Large, of Déols, still in a tolerable state of preservation. It was considerably extended in the reign of Louis XIII., who constituted it a duchy in favor of the descendants of Henry II. of Bourbon, prince of Condé. Charles of Bourbon sold it to Louis XV., who conferred it on one of his mistresses, at whose death it returned to the crown. During the revolution of 1793 it was called Indreville. Pop. (1896) 23,863.

Chatelain, shä-tē-lān. See CASTELLAN.

Chatelard, shä-tē-lär. See CHASTELARD.

Châtelet, shä-tē-lā, Belgium, a manufacturing town in the province of Hainaut, on the Sambre, five miles east of Charleroi. Its chief industries are the manufacture of cotton-stuffs, knives, nails, and pottery. Pop. (1897) 11,255. Châtelineau, opposite to it, has a pop. of (1897) 11,519.

Châtelet was anciently a small chateau or fortress, and the officer who commanded it was called *châtelain.* The word is a diminutive of *château,* formed from *castellum,* a diminutive of *castrum;* or from *castellatum,* a diminutive of *castellum,* castle. The term, in later times, has been applied to certain courts of justice, established in several cities in France. The Grand Châtelet, in Paris, was the place where the presidial or ordinary court of justice of the prévôt of Paris was kept, consisting of a presidial, a civil chamber, a criminal chamber, and a chamber of police. The term signified the same at Montpellier, Orleans, etc. When Paris was confined to the limits of the old city (*cité*), it could be entered only by two bridges (Le Petit Pont and Le Pont au Change), each of which was fortified with two towers — a smaller one in the wall, facing the city, and a larger one before the bridge, toward the country. These two exterior turrets were the Grand and Petit Châtelet. The tradition that the Grand Châtelet was built by Julius Cæsar, though adopted by some, is not well supported; but it is certain that the great tower was standing as early as the siege of the city by the Normans (885). The Grand Châtelet was the castle of the counts of Paris, and therefore the seat of all the royal courts of justice within the city and county, and also of the feudal court. The city had no proper jurisdiction whatever; its bailiff or provost (*prévôt*) was appointed by the king, and was president of the court (though only nominally, because he had no voice in the judgments), and, by virtue of his office, leader of the nobility. The office of provost of the merchants (*prévôt des marchands;* in other cities *maire*), established before the former, and afterward united with it for a time, was finally separated from it in 1388. The business of the Châtelet was transacted by the deputies of the bailiff (*lieutenants*), of whom there were five, three for civil causes, one chief judge of criminal cases, and a lieutenant-general of police (*lieutenant-général de la police*). The latter, indeed, was minister of police for the whole kingdom, and at the extent of his functions and power, particularly after the new arrangement made by the celebrated d'Argenson under Louis XIV., rendered him one of the most important officers of the state. In the Châtelet, however, he held only the fourth place. The whole court of justice was composed of 57 counselors, with 13 state attorneys, and a multitude of subalterns, as 63 secretaries or *greffiers,* 113 notaries, 235 attorneys, etc. All these offices were sold. The place of the first officer of the civil chamber was rated at 500,000 livres; that of a notary at 40,000 livres. The Châtelet was first in rank after the supreme courts (*cours souveraines*).

Châtellerault, shä-tĕl-lē-rō, France, in the department Vienne, 20 miles north-northeast of Poitiers. It stands on the right bank of the Vienne, which here becomes navigable, and is a place of some antiquity, having once been the capital of a duchy which, in 1548, was bestowed by Henry II. on the Earl of Arran, regent of Scotland, and still gives a title to his descendant, the Duke of Hamilton. The old walls and fortifications of the town have been removed and the site converted into promenades. There are here manufactures of cutlery, hardware, jewelry, lace, etc., and a good trade. Pop. (1896) 20,014.

Chat'field-Taylor, Hobart Chatfield, American novelist: b. Chicago, Ill., 25 March 1865. He was graduated at Cornell University in 1886, and has written: 'With Edge Tools' (1891); 'An American Peeress' (1893); 'Two Women and a Fool' (1895); 'The Land of the Castanet' (1896); 'The Vice of Fools' (1898); 'The Idle Born' (1900).

Chatham, chăt-ăm, **William Pitt,** EARL OF, English statesman: b. Westminster 15 Nov. 1708; d. Hayes, Kent, 11 May 1778. He was educated at Eton and Oxford. On quitting the university he became a cornet in the blues, and in 1735 represented the borough of Old Sarum (the property of his family) in the House of Commons, where he attracted universal notice. He was a powerful opponent of Sir Robert Walpole, who revenged himself by taking away his commission. In January 1741, he delivered the speech reported by Johnson for the 'Gentleman's Magazine,' beginning, "The atrocious crime of being a young man, which the honorable gentleman has with such spirit and decency charged upon me, I shall neither attempt to palliate nor deny." But it is probable that there is more of Johnson than of Pitt in it. In 1744 he received, on account of his patriotism, a legacy of £10,000 from the Duchess of Marlborough; became in 1746 vice-treasurer of Ireland, paymaster-general of the army, and member of the privy council. In 1755 he resigned the paymaster's office. In 1756 he was appointed secretary of state, but was dismissed the same year on account of his opposition to the Hanoverian policy of George II. The nation, however, was enthusiastically attached to him, and the public discontent was so loudly manifested, that he was appointed secretary of state again in 1757. His great mind now revealed its full force. His ascendency was complete over the Parliament no less than in the ministry; he aroused the English nation to new activity. In 1760 he advised the declaration of war against Spain while she was unprepared for resistance, as he foresaw that she would assist France. The elevation of England on the ruins of the house of Bourbon was the great object of his policy. But his plans were suddenly interrupted by the death of George II. George III. was prejudiced against Pitt by his adversary, the Earl of Bute, a statesman of limited views. Pitt therefore resigned his post in 1761, only retaining his seat in the House of Commons. On his retirement his wife was created Baroness Chatham. In 1762, when Spain formally allied herself with France, Pitt urged the continuance of the war, by which both states would perhaps have been totally exhausted; but peace was concluded by the opposite party in 1763. Pitt uniformly supported the cause of the people. Foreseeing the separation of the American colonies from the mother country, if the arbitrary measures then adopted should be continued, he advocated, especially in 1766, a conciliatory policy, and the repeal of the Stamp Act. In the same year he was invited to assist in forming a new ministry, in which he took the office of privy-seal, and was created Viscount Burton, Baron Pensent, and Earl of Chatham. In 1768 he resigned, but in the House of Lords continued to recommend the abandonment of the coercive measures employed against America, particularly in 1774. His warning was rejected, and in 1776 the colonies declared themselves independent. In vain did he renew his motion for reconciliation in 1777; in vain did he declare the conquest of America impossible. On 7 April 1778, though laboring under a severe illness, he repaired to the House, to attack the unjust and impolitic proceedings of the ministers toward the colonies. At the close of his speech he fainted and fell backward; he was conveyed out of the House, and afterward removed to his country-seat at Hayes, in Kent, where he died a month later. The Parliament annexed an annuity of £4,000 to the earldom of Chatham, his debts were paid, and he was honored with a public funeral, and a magnificent monument in Westminster Abbey. Another was erected in 1782 in Guildhall. His popularity in America was very great and several localities were named Chatham in his honor, as well as Pittsburg, Pa., and Pittsfield, Mass.

Chatham, New Brunswick, Canada, at the mouth of the Miramichi, and on its right bank, 98 miles northeast of Fredericton. It has a good harbor, is an important port of entry, has a Roman Catholic cathedral and college, and a large trade in lumber. Pop. (1891) 5,644.

Chatham, chăt'am, Ontario, Canada, city on the Thames, 1½ miles north of Lake Erie, with manufactures of machinery, woolens, soap, and candle works. It is a trade centre, with good facilities for shipping the products of the surrounding country, and has a trade in lumber. Pop. (1901) 9,052.

Chatham, England, now a parliamentary and municipal borough, naval arsenal, and seaport, in county Kent, on the Medway, about 33 miles by rail from London, practically forming one town with Rochester. As a parliamentary borough it includes Gillingham and New Brompton, and returns one member. Until a recent period a great portion of the town was irregular and ill-built, but recently considerable improvements have been carried out, and are still in course of progress. The great features of Chatham are the naval and military establishments here or in the immediate vicinity. The dockyard was founded by Queen Elizabeth previous to the period of the Armada, and during this reign Upnor Castle, on the left bank of the Medway, was erected to protect the dock and shipping. Despite the fire from the castle, however, in 1667, Van Ghent, a vice-admiral of De Ruyter's, succeeded in breaking the chain stretched across the river, burned and sunk several ships, and retired bearing off the warship, the Royal Charles, as a prize. Subsequently the fortifications were greatly strengthened and enlarged, but the great increase in the power of

modern ordnance having rendered parts of the works of little value, a number of out-lying forts have had to be built. With its modern extensions the royal dockyard now extends for about two miles along the river, and is most thoroughly equipped for the building, fitting out, and repairing of war vessels. Among recent additions are three basins for iron-clad warships, with a total area of about 75 acres. One of these, the repairing basin, has an area of 22 acres, and is connected with four dry-docks. It has 3,500 feet of wharfage, is 80 feet wide at the entrance and about 30–32 feet deep at high water. The largest, or fitting-out basin, has a water area of 33 acres, with 5,800 feet of wharfage, and a depth of 30 feet. From it the heaviest war-ships fully equipped are able to proceed direct to sea. The factory basin (20 acres area) is intended for fitting vessels with their engines, etc. The engine factories and machine works on the south side of this basin are about 2,500 feet long, and occupy about 14 acres. The cost of these works was nearly $15,000,000. The largest class of iron-clads are built here. There are several covered slips for building ships upon, the iron roofs of some costing $50,000. The rope-house has a length of 1,200 feet; there are great saw-mills, and the forges turn out armor plates, anchors, and other articles required for the battle-ships of the present day. In short, all the requisites of a great naval station are here on the most complete scale. The military establishments include extensive infantry barracks, and barracks for the royal marines; the headquarters of the royal engineers, arsenal and park of artillery, hospitals, etc. The whole is surrounded by a very extensive system of fortified works, rendering Chatham a place of great strength. The old convict prison has been partly pulled down and replaced by naval barracks. The fortifications are regarded as a defense for London, a protection against an invasion from the south coast. Chatham is one of the chief ship-building towns of England; but the people do not forget the noted dead of the nation. A statue to Lord Waghorn reminds them of his work on the "overland route" to India, and a monument to Gordon represents him as an explorer. Charles Dickens lived some time in Ordnance Place, Chatham. Pop. (1901) 78,746. of the parliamentary borough.

Chatham Island, the most important of the Galapagos archipelago (q. v.); 600 miles from Ecuador, which owns the group, and uses Chatham, Charles, and Albemarle as penal settlements for political offenders. Its interest to Americans lies in the negotiations opened with Ecuador in March 1900, to buy it for a Pacific coaling station.

Chatham Islands, in south Pacific Ocean, belong to New Zealand. The group, three in number, are in lat. 44° 7′ S.; lon. about 176° 49′ E. The group is of volcanic origin. Chatham, the largest island, is about 38 miles long and 25 broad. The other islands are Pitt Island, 12 miles long by 8 broad; and Ranga Tira, a mere rock The harbor of Waitangi, on the west side of Chatham Island, is much frequented by whaling vessels, which there supply themselves with fuel, provisions, and water. There are few hills in the island, and the highest does not exceed 800 feet. In the interior of the largest island is a brackish lake. The soil is in many places fertile, and crops of potatoes and wheat have been successfully and extensively cultivated and exported. Turnips, cabbages, pumpkins, and tobacco are also successfully cultivated. The creeks and shores abound in fish, many of them excellent; sharks of formidable size are numerous. Stock raising and seal fishing are prominent industries. The original inhabitants, now nearly extinct, are a cheerful and good-natured race. About the year 1830 they amounted to some 1,200, but they now number little more than 30. The destruction of this unfortunate people is attributed to the cruelty and tyranny of the New Zealanders, a number of whom migrated to the island in 1836, and by the superior energy and ferocity of their character soon became masters of the inoffensive aborigines. The present population amounts to about 400, more than half of whom are Maoris. The Chatham Islands were discovered by Lieut. William Robert Broughton, of H.M. brig Chatham, and taken possession of by that officer in name of his Britannic majesty, 29 Nov. 1791.

Chati, chă-tē, a wildcat (*Felis mitis*) ranging from Mexico to Paraguay, in warm lowlands and woods. The body, including the head, is from 24 to 27 inches long, the tail about 14 to 18 inches. The fur is soft and tawny, spotted with black. This cat is by some naturalists considered a variety of the **margay** (q.v.).

Chatillon - sur - Seine, shä-tē-yôṅ-sûr-sān, France, department of Côte d'Or, 45 miles northwest of Dijon, on the Seine. Pop. (1896) 5,000.

Chat'moss, an extensive morass, area about 6,000 to 7,000 acres, situated chiefly in the parish of Eccles, Lancashire, England. It is remarkable as being the scene of operations for reclaiming bog-land, first successfully carried out on a large scale in the end of the 18th and beginning of the 19th century; also for offering one more field of triumph to George Stephenson, who carried the Liverpool & Manchester Railway over it after all other engineers had declared the feat impossible. Stephenson spread branches of trees and hurdles interwoven with heather on the surface of the bog, and placed a thin layer of gravel over all; upon thi sleepers and rails were laid in the ordinary way.

Chatoyancy, or **Change of Colors,** is the property possessed by a few minerals of displaying different colors by reflected light, when the specimen is revolved. Thus labradorite ordinarily has a dull gray color, but when revolved, a position will be reached in which the surface of the specimen will exhibit great sheets of gorgeous blue, green or copper-red colors. The cause of the phenomenon differs in the several minerals showing it. In the case of labradorite it is apparently due to interference, while in tiger-eye (q.v.) it is the result of the fibrous structure. The beautiful chatoyancy of cat's-eye (q.v.) usually due to enclosed fibers of asbestos or other fibrous minerals, is more properly regarded as opalescence. Compare also PLAY OF COLORS and SCHILLER.

Chatrian, shä-trē-äṅ, **Alexandre.** See ERCKMANN, EMILE.

Chats'worth, England, the celebrated estate of the Dukes of Devonshire, situated in the

parish of Edensor, in Derbyshire. It was among the domains given by the Conqueror to his natural son, William Peveril. It was purchased in the reign of Elizabeth by William Cavendish, who commenced to build a mansion on it, which was completed by his widow, the Countess of Shrewsbury. The present building was nearly completed by the first Duke of Devonshire, and a new wing was added by the sixth Duke. The façade is 720 feet long, or with the terraces, 1,200 feet. The mansion forms a square, with an inner court, and is remarkable for the collections of pictures and statues it contains. The park is about 11 miles in circumference. The grounds have been laid out by Loudon and Sir J. Paxton. The conservatory covers nearly an acre, and is 65 feet high. In the old building Mary Stuart was imprisoned for 13 years. Hobbes, the philosopher, lived for some time here.

Chattahoo'chee, a river in the northern part of Georgia, rising in the Appalachian Mountains, and flowing first west and then south, forming, for a considerable distance, the boundary between the above State and Alabama. In its lower course, after the junction of the Flint River from the east, it is named the Appalachiola, and is navigable to Columbus for steamboats. Total course, about 550 miles.

Chattahoo'chee Stage, in American geology, the lower rocks laid down in older Miocene time along the Atlantic coast of what was then the continent of North America. Strata of this stage probably extend, except for a break in Maryland and Virginia, from Cape Cod to Texas, and in the north are clays and uncompacted sand, changing to limestones in the south. The typical exposures of the Chattahoochee stage are on the Chattahoochee River in southwest Georgia and northwest Florida. Here are beds of clay, marl, and limestone about 200 feet thick. The Chattahoochee stage corresponds in age to the John Day beds in Oregon, and to some of the Miocene gold-bearing gravels of the Sierra Nevada. See MIOCENE SERIES; TERTIARY SYSTEM.

Chattanooga, Tenn., a city and county-seat of Hamilton County, an important railroad, trade, and manufacturing centre, on the south bank of the Tennessee River, and on the Southern, Central of G., Nashville, C. & St. L., Cincinnati, N. O. & T. P., Alabama G. S., and other R.R.'s. It is situated near the Georgia and Alabama boundaries, at the base of the Cumberland plateau, 698 feet above the level of the sea. It is the centre of, and the largest place in, the quadrangle formed by Nashville, and Knoxville, Tenn., Birmingham, Ala., and Atlanta, Ga., distant respectively 151, 112, 143 and 137 miles. The district around as the gateway of the Cumberland range between the three States, was one of the greatest strategic points during the Civil War, and is historic for many bloody and famous battle-fields. To the southwest is Lookout Mountain, commanding a superb view of six or seven States; on the east is Missionary Ridge; and south by east, a few miles away in Georgia, is the field of Chickamauga, now turned by the government into a national military park — to be also the seat of a permanent army post, where several thousand State militia are to be exercised yearly in evolution by regular army officers. The Seventh United States Cavalry is stationed there, and barracks are under construction. At the southeast corner of the city itself is a national cemetery, one of the largest in the country, containing 13,362 graves. The whole region is a noted tourist resort, for historic and scenic reasons. The finest structures in the city are the custom-house of marble, and the *Times* building. The Baroness Erlanger Hospital is the most noted charitable institution. For higher education, it contains the U. S. Grant University, the Chattanooga Medical College, and the Chattanooga Normal University. There is also a public library, to which Mr. Andrew Carnegie has donated $50,000 for a library building.

Trade and Manufactures.— The river here is navigable eight months in the year, and the Muscle Shoals Canal gives unbroken passage to its mouth by the Chattanooga & Tennessee River Packet Company; while northeastward, steamers run to Kingston, and at high water to Knoxville, 200 miles, by water. But the great and growing importance of Chattanooga is in manufacturing, which it owes to the adjacent deposits of coal, iron, clays, and many other minerals, and the forests. It has a larger variety of small manufactures than any other Southern city, and some of great magnitude. The chief are iron and iron goods, flouring and grist-milling, lumber and furniture, and patent medicine. The first of these in 1900 produced $2,553,422 worth of goods; the second $2,287,268; the third $922,000. It has the largest manufacture of steam boilers in the United States, next to Erie, Pa.; the largest steel-roofing, wagon, furniture, refrigerator, hosiery, and patent-medicine works in the South; the largest oak-bark tanning and metallic paint works in the United States, and the largest manufacture of kitchen furniture, iron soil-pipes, acetylene gas-burners, slate-pencils, and curtain poles in the world. In 1900 there were 332 plants, producing goods to the total value of $12,033,780; there are now 370; and the increase of employees is said to have been 20 per cent since 1900. There are seven banks in the city, with deposits of over $6,250,000, and five of them are in a clearing-house.

Government and Finances.— There is a two-years' mayor and a bicameral council. The annual outlay is about $300,000, the heaviest item in 1902 being $48,500 for schools. In 1902 the assessed valuation was $14,000,000, the debt $931,000, and the municipal tax-rate $14.50 on a thousand.

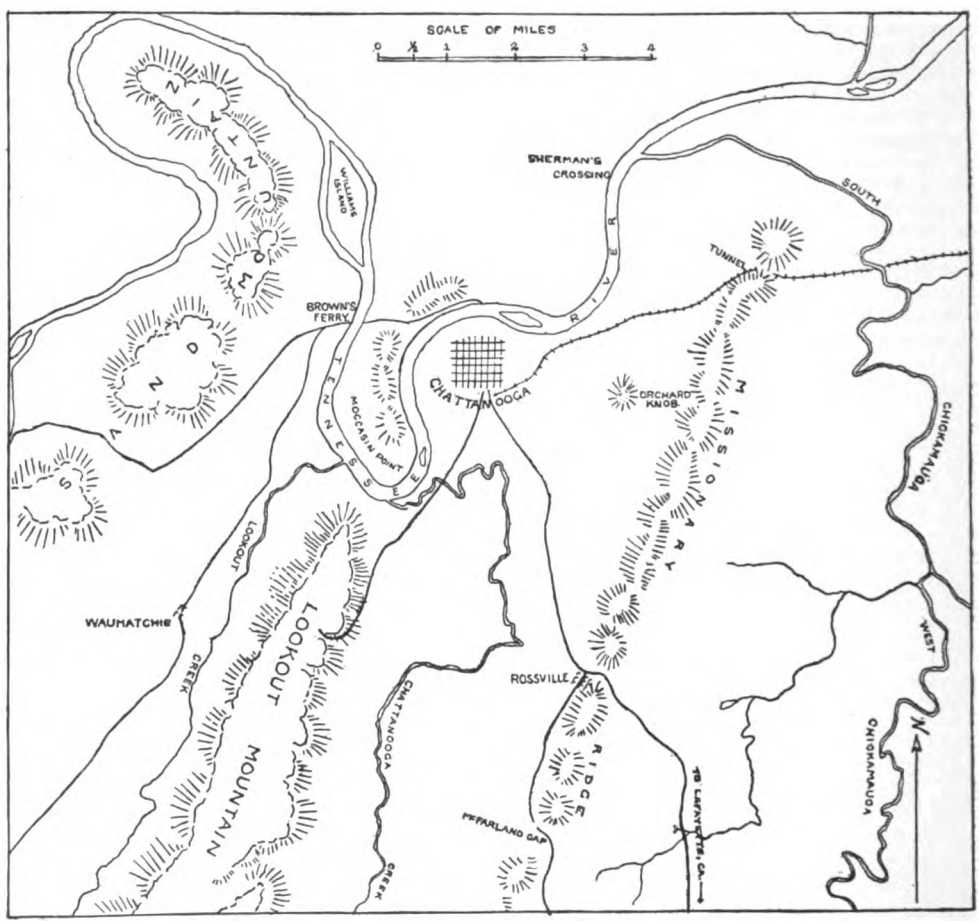
Population and History.— Chattanooga, originally called Ross Landing, first appears in the census in 1860 with 2,545 people. In the War, being a storm centre, it was nearly destroyed; but as in the case of some other southern cities, the War was its making. It was an important military post, and the iron industry started in a rolling-mill opened in order that the ruined railroads might be rebuilt. The attention of capital had also been called to its great advantages of situation. In 1870 it had a population of 6,093; in 1880, 12,892; and in 1890, 29,100. The growth of the city was retarded by the general business depression which followed the financial reverses of 1893; but a revival came with the concentration of some 70,000 soldiers there in 1898, and the consequent immense disbursements. Since then it has been rapidly moving forward; and though the Federal census of

1900 shows 30,154, it is claimed that the corporate limits, which are less than four square miles, are too restricted, and that the addition of the 22 suburbs belonging to it would raise the population to nearer 55,000. The increase in school attendance, in post-office receipts, etc., has been very large in the past three years.

B. L. GOULDING,
Vice-President Chattanooga Library Association.

Chattanoo'ga, Battle of. At the close of the battle of Chickamauga, Ga., 20 September, the Union army, in withdrawing from the field, having interposed at Rossville, Ga., between Missionary Ridge the same distance east of it, the mountain and the ridge being parallel, running nearly north and south and about four miles apart. The Tennessee River touches the base of Lookout. The city lies to the northeast in a great bend of the river. The advance line of the Confederates was half way between the ridge and the city, upon a low intermediate ridge, at the right of which was Orchard Knob, an isolated knoll rising some 60 feet above the plain.

Lookout Mountain commanded the river line to Bridgeport and Stevenson, the main depots



CHATTANOOGA, TENN.
AND VICINITY.

Bragg and Chattanooga, advanced into that city the night of the 21st and morning of the 22d, and immediately began to fortify it. Bragg followed on the 22d, and his lines were soon established in front of the place, his left resting on the Tennessee River and Lookout Mountain, below the city, his centre extending across the plain to the foot of Missionary Ridge, his right being established at the foot of the ridge and reaching toward the Tennessee River above. The north point of the Lookout Mountain range is three miles southwest of Chattanooga, and of supply. This necessitated a wagon-haul of 60 miles over the Cumberlands and the adjacent range of Walden's Ridge, all precipitous and barren mountains. The Union army was soon running short of supplies, the fall rains rendering the roads almost impassable. On 19 October, the day that Rosecrans had perfected the general features of a plan for regaining the river line of supplies, he was relieved from command and Gen. Geo. H. Thomas assigned, who at once ordered the preparations inaugurated by Rosecrans to go forward.

Immediately after the battle of Chickamauga Gen. Hooker with the Eleventh and Twelfth corps was sent from the army of the Potomac and arrived at Bridgeport, Tennessee, 30 September. Sherman, in camp east of Vicksburg, had been ordered up with four divisions. Grant was sent to take general command. Upon arriving, 23 October, he approved the plans for opening the river, and directed their execution. Gen. Hooker was to advance into Lookout Valley, and a co-operating force from Chattanooga under Gen. W. F. Smith was to seize Brown's Ferry below Lookout Mountain, throw a bridge there and form a junction with Hooker. These movements were successfully executed during 27 and 28 October. The Eleventh corps (two divisions) and Geary's division of the Twelfth corps entered Lookout Valley the afternoon of 28 October, the Eleventh corps proceeding to Brown's Ferry and formed a junction with Gen. Smith's troops from Chattanooga. Geary, with six regiments of his division, halted near Wauhatchie Station. At midnight of the 28th Geary was attacked by Jenkins' (Hood's) division, six regiments, of Longstreet's corps, supported by Law's division. Schurz's division coming to Geary's support, Longstreet's troops after three hours' fighting withdrew to the east side of Lookout, and the Wauhatchie or Lookout Valley remained thereafter in Union control. Abundant supplies by the river then reached Chattanooga by a short wagon-haul from Brown's Ferry. On 4 November, shortly after the battle of Wauhatchie, Longstreet's corps was detached by Bragg and sent to Knoxville.

The battle of Chattanooga, which occurred three weeks later, embraced three days' operations, 23, 24, and 25 November. At the opening Bragg's lines were as already described. Hooker, with Geary's division and Cruft's from the Fourth corps of the Army of the Cumberland, occupied Lookout Valley, the Army of the Cumberland and the Eleventh corps were on the lines about Chattanooga, and Sherman with three divisions had crossed at Brown's Ferry and was concealed behind the hills above Chattanooga and on the opposite side of the river from the city.

Gen. Grant's force for his firing lines was about 60,000, and the Confederates' a little less than 40,000. The formidable natural positions of the latter were held to give them superior advantages.

Grant's plan of battle was for Hooker to hold Lookout Valley against Bragg's left. Sherman was to cross the Tennessee opposite the north end of Missionary Ridge, which was unoccupied, and carry it to the railroad tunnel about half a mile south of its northern end. Sherman, then, astride of the ridge, was to move south; while Thomas, with the Army of the Cumberland before the city, was to connect its left with Sherman's right, and together sweeping south they were to clear the ridge and the valley. As the engagement progressed, every feature of this plan was changed by unexpected developments.

At noon, 23 November, Gen. Thomas, being directed by Grant to ascertain if the Confederates still occupied their lines and camps between the city and Missionary Ridge, paraded five divisions in full view of the Confederate positions, which, as was afterward ascertained, was at first supposed to be a review. Wood's division was in the centre advanced, Schurz's and Steinwehr's divisions of the Eleventh corps were refused on the left, and Sheridan's and Baird's on the right. At a bugle signal at 1:30 P.M. the centre advanced rapidly, and, after a sharp contest, captured Orchard Knob, and forced the abandonment of the entire line of the Confederates through the centre of the plain, reversed the works at and near the Knob and held them. This was the first day's battle.

The night of the 23d Sherman with three of his four divisions which had reached his concealed camps opposite the city and north of it, marched to the North Chickamauga, where 116 pontoon boats awaited him. These were filled with soldiers, floated down the creek to the river, and thence to the opposite shore, and by daylight of the 24th 8,000 of Sherman's troops were in line fronting Missionary Ridge, two miles from it, and opposite its northern extremity, which point was not occupied by the Confederates until 2:30 in the afternoon. At 1 o'clock the three divisions, and one from the army of the Cumberland which had covered the movement having crossed, the lines were advanced, and at 4 o'clock a range of unoccupied hills north of and overlooking the north end of Missionary Ridge was occupied without resistance, and strongly intrenched under the supposition that these formed the north end of the ridge contemplated in the order of battle. The mistake was due mainly to the misty weather, and the omission of any reconnoissance.

At 2:30 P.M. Cleburne's division arrived at the north point of the ridge and entrenched.

Gen. Thomas, having obtained Grant's permission to make a demonstration against the Confederate position on Lookout, Hooker made ready to move at an early hour on the 24th.

The Confederates held the top of the mountain, which was a narrow plateau 1,700 feet above the valley, protected by perpendicular palisades varying from 75 to 250 feet high. From the foot of these walls of rock the mountain sloped westward to Hooker's position in Lookout Valley eastward to the plain south of Chattanooga, while its north slope descended to the Tennessee River opposite Moccasin Point. It was approximately a mile and a half from the foot of the palisades to the valley. The battle took place on these slopes. No Union troops reached the top of the mountain during the engagement. The morning of the 24th, Brown's and Pettus' brigades of Stevenson's Confederate division, with a battery of four Napoleons, occupied the summit, and Walthall's and Moore's brigades of Cheatham's division the slopes of the mountain, Walthall's holding the western slope and Moore's the northern.

Hooker's forces consisted of three brigades of Geary's division of the Twelfth corps, two brigades of Cruft's division of the Fourth corps, and two brigades of Osterhaus' division of Sherman's army. This latter division had been prevented from following Sherman over the river by the breaking of the pontoon bridge at Brown's Ferry. Hooker's aggregate strength was something over 9,000. Walthall's brigade, which sustained almost the entire attack until the western and northern slopes had been carried, did not number over 1,700. There were 250 men of Moore's brigade on picket, which were mostly captured early in the engagement.

The head of Hooker's column crossed Lookout Creek at Light's Mill near Wauhatchie, at 8 o'clock in the morning, and, concealed by the fog which hung over the mountain, marched directly up the western slope until the head of the line reached the base of the palisades. His line then faced toward the north point of the mountain, distant about two miles.

After an advance of a mile and a half with Geary's brigades, Cobham's, Ireland's, and Candy's, in advance, and Whitaker's of Cruft's division in reserve, the troops struck the left flank of Walthall's line protected by slashed timber. This was carried, and in the face of stout resistance the Confederates were driven around the north point of the mountain, and across its northern slope. As Geary's attack opened, first Grose of Cruft's division and next Wood and Williamson of Osterhaus', successively joined the left of the lines, and advanced with the swinging movement on the slopes of the mountain. Until the northern slope had been carried to the Craven House, Walthall had no assistance. Moore advanced as he was being pushed back from the Craven House, but was immediately repulsed. Pettus arrived at one o'clock and relieved Walthall after he had withdrawn some 400 yards from the Craven House. This enabled Walthall to procure ammunition, re-form, and take his place on the line again. This position was held until three o'clock in the morning, when, the troops and supplies from the top having been withdrawn and safely started across the plain for the Missionary Ridge line, this final line was also withdrawn, and the mountain abandoned. The troops on the summit, on account of the fog, could do little damage to the Union lines. Hooker was materially assisted by batteries on the elevated points in Lookout Valley, and those across the river on Moccasin Point, which swept the northern slope. The next morning the Union forces occupied the summit.

The capturing of Lookout Mountain decided Gen. Bragg to withdraw his whole army from the plain to the crest of Missionary Ridge, except as heavy picket forces were left in the entrenchments at the base of the ridge.

Hooker's losses at Lookout, and the next day at Missionary Ridge, which were small but not definitely reported, were: Killed, 81; wounded, 390. The Confederate loss was: Killed, 21; wounded, 177. Walthall lost 845 captured, mostly from his long picket line at the base of the mountain. Moore's missing were 199, and Pettus' 9.

During the night of the 24th and the early morning of the 25th, Bragg concentrated his army on Missionary Ridge, and in the earthworks at its base. This was his first occupation of the crest of the ridge in force. His new line extended from Rossville, a distance of eight miles to the north end of the ridge, his divisions from Rossville northward being Stewart's, Breckinridge's (Bate's), Hindman's (Patton Anderson's), Cheatham's, Walker's, Stevenson's, and Cleburne's.

The battle of the 25th opened soon after seven o'clock by an assault of Sherman upon the north end of the ridge, defended by Cleburne. Sherman's force consisted of his own divisions of Morgan L. Smith, Hugh Ewing, and John E. Smith, with the divisions of Jeff. C. Davis from the Army of the Cumberland, and Schurz and Steinwehr of the Eleventh corps. While the four brigades of Corse, Matthies, Raum, and Giles A. Smith reached the crest at different periods, none was able to maintain position there, though Corse and Smith held on stubbornly under the crest until toward evening, when all were driven from the slopes. The fighting of the troops sent in was persistent and most courageous, but Cleburne, at first alone, and later supported by Stevenson's division and a part of Walker's, repulsed all assaults. The last one, about 3:30 P.M., was especially serious.

Grant, on Orchard Knob, observing this repulse, ordered Gen. Thomas to advance his four divisions at the centre against the earthworks at the foot of the ridge as a diversion in favor of Sherman, hoping thereby to cause the withdrawal of Confederate forces from his front. The four divisions which were ranged along the Orchard Knob line were, from left to right: Baird, Wood, Sheridan, and Johnson. The line was two and a half miles long, and faced the ridge at distances from three quarters of a mile to a mile from it. There were 11 brigades and 89 regiments in the lines as prepared for the assault. The formation was such as to present the appearance of being four lines deep. At a signal of six cannon shots from Orchard Knob the four divisions rushed for the earthworks at the foot of the ridge. On the summit opposed to this advance were 13 brigades and 16 batteries. The cannonading of nearly 100 guns from the crest was terrific, and the line was soon under rifle-fire from the works at the base, but the entire line of earthworks was captured as soon as the troops by running could reach them. Reforming their lines in the earthworks, Baird's division on the left and Johnson's on the right began the storming of the ridge without further orders. In Baird's division the horses of field officers had been left behind at the start, because as he announced he had intimations that the intention was to go to the summit, and it was easy to see that the slopes were too steep for mounted men to ascend. In the same way Johnson's men were informed at the start that the movement was to be an attack on the ridge. At the centre in Wood's and Sheridan's divisions the orders as understood by most were to stop at the rifle-pits, but the men ignored these and started forward, and soon orders were received to go to the top. The whole line of brigades gained the crest so nearly together that it has always been difficult to determine which, if any one, was the first.

The long lines of the storming party moved up the slopes with few checks, and in an hour had carried three miles of the crest and captured 37 guns and about 2,000 prisoners.

Just as the orders were given Thomas for this assault at the centre, Hooker, who had descended Lookout at one o'clock and started to attack the south end of the ridge in Rossville Gap, reached that position. He had been detained by the necessity of rebuilding a bridge over Chattanooga Creek. He at once sent Osterhaus' division through the gap and turned it north along the east side of Missionary Ridge. Cruft's division assaulted and carried the south end of the ridge in the gap while Geary moved along the western base of the ridge and finally ascended to the crest, reaching it soon after the right of Thomas' assault had occupied it.

As Baird's division reached the crest, it turned northward and became hotly engaged

GEOFFREY CHAUCER.

with Walthall's brigade, assisted by Jackson's and Moore's, of Cheatham's division. Darkness coming on, the fighting ceased. Walthall's stand across the ridge had made it possible for Cleburne's, Stevenson's, Walker's, and Cheatham's divisions to withdraw in order and unmolested. The centre and left retreated in general confusion, Bate's division, however, soon rallying for a stout resistance as rear guard.

Two myths of the battle have gained general currency. The movements of the Confederate troops which retired from Lookout Mountain and were early sent to confront Sherman gave rise to the report that Bragg was weakening his centre to concentrate against Sherman. But not a single soldier or gun was sent from the centre against Sherman during the day. On the contrary, three brigades, John C. Brown's, George Maney's, and Alfred Cummings', were hurried from Sherman's front to resist the assault of Gen. Thomas at the centre.

The second long perpetuated error is that when Gen. Sherman advanced to the unoccupied hills beyond the north end of Missionary Ridge he had carried the ridge to the tunnel as was contemplated in the order of battle. He did not secure any portion of the ridge during the battle, although those troops which were put in fought desperately. Eleven brigades of his force were held as reserves and were not engaged, Gen. Sherman thinking it necessary to guard against an attack upon his left.

Bragg was promptly pursued. His rear guard made a stubborn stand at Ringgold Gap, but his army was first rallied at Dalton, where it remained until the opening of the Atlanta campaign in the spring of 1864.

The losses at Chattanooga, including the three days' battles and the affairs in pursuit to Ringgold, were for Grant: Killed, 703; wounded, 4,722; missing, 349; total, 5,844; for Bragg: Killed 361; wounded, 2,180; missing, 4,146; total, 6,687. Consult 'War of the Rebellion Records,' Vols. XXX. and XXXI., Parts 1 and 2.

H. V. BOYNTON.

Chattel Mortgage, a transfer of personal property as security for a debt in such manner that upon default the chattel becomes the property of the mortgagee.

In the absence of statute no special form is necessary, the terms depending to a great extent on the intention of the parties. Between the parties to a mortgage, a delivery is not necessary, but to be binding on creditor's delivery to the mortgagee or notice to the creditors is necessary. In mortgage, title, and possession passes; in pledge, possession passes, but title remains in the pledgor.

At common law it was necessary for the chattel to be in possession of the mortgagor at the time the mortgage was given, so as to be binding against creditors; but if the mortgagor acquired title after the mortgage had been given, it was good as between the parties, but not as to creditors. In equity a chattel mortgage is considered in the nature of an executory agreement.

Chattels, property movable and immovable, not being freehold. The word chattels is originally the same word with cattle, all property being reckoned in early periods by the number of heads of cattle possessed, or their equivalent. From the fact that cattle were reckoned by the head, it appears probable that they were called *capitalia* (from the Latin *caput,* the head), which became contracted by syncope into *captalia,* and then *catalia,* whence the legal term *catalla,* and our "chattels" and "cattle." Hence the word chattels signified originally only movable property, but in course of time came to be applied to all property not held in feudal tenure. Chattels are divided into real and personal. Chattels real are such as belong not to the person immediately, but dependently upon something. Any interest in land or tenements, for example, is a real chattel; so also is a lease, a rent for a term of years, an interest in advowsons, etc. Chattels personal are goods which belong immediately to the person of the owner, and include all movable property. Chattels usually pass to the executor, except such, for instance, as trees, which may not be severed from the freehold, and therefore pass to the heir.

Chatterers, the popular name of certain insessorial birds of the family *Ampelidæ,* genus *Ampelis,* as the Bohemian chatterer or waxwing (*A. garrula*) and the chatterer of Carolina (*A. cedrorum*).

Chat'terton, Thomas, English poet: b. Bristol 20 Nov. 1752; d. there 24 Aug. 1770. At about 10 years of age he acquired a taste for reading, which became, from that period, a kind of ruling passion. His former melancholy gave way to vivacity and vanity, and dreams of glory, fortune, and immortality. His father had accidentally obtained possession of a number of old parchments of the 15th century. Many of these were consumed in the family, but several fell into the hands of Chatterton, who after a few days declared that he had discovered a treasure. He then procured glossaries of the old dialects of the country, and in 1768, when the new bridge at Bristol was completed, he inserted a paper in the Bristol 'Journal,' entitled 'A Description of the Friar's First Passing Over the Old Bridge, Taken from an Ancient Manuscript.' He was then but 16 years old. Upon being questioned as to the manner in which he had obtained it, he finally asserted that he was in the possession of several valuable old manuscripts, taken from an old chest in Redcliffe Church. He had been engaged for a year in the composition of several poems, which he attributed to different ancient writers, particularly to one Rowley. In 1769 he ventured to write to Horace Walpole, who was then engaged upon his 'Anecdotes of Painters,' giving him an account of a number of painters who had flourished in Bristol, which Chatterton pretended to have discovered along with several ancient poems in that city, and received a polite answer. Discontented with his situation, he went to London. The favorable reception which he there met with from the booksellers inspired him with new hopes. He wrote for several journals on the side of the opposition and indulged the hope of effecting a revolution, boasting that he was destined to restore the rights of the nation. Failing to procure the rewards which he had expected, his situation daily became worse. Although extremely temperate, and often voluntarily confining himself to bread and water, he was frequently destitute even of these necessaries. At last, after having been several days without food, he poisoned himself in 1770, when not yet 18 years old. His works were more extensively read as

the public became acquainted with the history of his misfortunes. The most remarkable are the poems published under the name of Rowley, which he composed at the age of 15 years. They display a vigorous and brilliant imagination, fertility of invention, and often a deep sensibility. Among the poems which he published under his own name his satires deserve the preference. His prose writings are spirited. Prof. Skeat's edition of his poems is one of the best. See biographies by Dix (1837), Wilson (1869), and Masson.

Chaucer, châ'sėr, **Geoffrey,** English poet, «the father of English poetry»: b. London probably about 1340; d. there 25 Oct. 1400. The date commonly assigned till lately for his birth was 1328, but all the evidence that there is to show on this matter points to a date considerably later. He was the son of a vintner named John Chaucer, but nothing is known of his education, and the earliest fact of his career that has been ascertained is that he is mentioned in the household book of the wife of Prince Lionel, second son of Edward III., in 1357. In 1359 he bore arms in France, and was taken prisoner at Retiers in Brittany, but he was ransomed the following year. The next mention of him occurs in 1367, when he is described as a *valettus* of the king, and from 1372 he is styled esquire. It is supposed that the marriage of Chaucer belongs to this period, but the whole circumstances are obscure. What alone is certain is that he received in 1374 a grant of £10 a year for life from the Duke of Lancaster in consideration of the good service which he and his wife, Philippa, had rendered the said Duke. It is thought that this Philippa was one of the ladies-in-waiting to Queen Philippa. She may have been, as some think, a cousin of the poet, but there is good reason to believe that she was the daughter of Sir Payne Roet. These connections increased his favor at court, and in 1367 he received from the king a pension of 20 marks. In 1372 he was sent to Genoa as a commissioner to negotiate a commercial treaty. On returning after a year he was appointed in 1374 comptroller of the customs on wool, skins, and tanned hides in the port of London, an office which was sufficiently lucrative. He was now in tolerably affluent circumstances, was employed by the court in various services, and in 1382 was appointed comptroller of the petty customs in the port of London. In 1386 he was returned to Parliament as knight of the shire of Kent, but in the same year his fortunes fell with those of his patron, John of Gaunt. He was deprived of both his comptrollerships, and thus reduced to a condition of comparative want. Three years later he was again in favor. Though not restored to the offices he had formerly held, he became clerk of the king's works at Westminster Palace and elsewhere, with permission to appoint a deputy. In 1391 he lost this place, but about the same time became a forester of North Petherton Park, Somersetshire. In 1394 he was granted an annuity of £20 for life by the king, and five years later Henry IV. added 40 marks to this, so that at his death his circumstances should have been quite comfortable. Chaucer's most celebrated work, which, although possibly begun in his earlier years, was certainly not all written till near the end of his life, is the 'Canterbury Tales.' These are all in verse, except the 'Tale of Melibœus' and the 'Parson's Tale.' The work remains unfortunately incomplete. The 'Tales' are distinguished for variety of character-painting and liveliness of description, and are marked alike by humor and pathos. In them, as in others of his works, Italian influence is clearly seen; and that Chaucer borrowed from Boccaccio is well known; yet, as Prof. Hales remarks, "For what is best in his best works he is debtor to no man." Chaucer's principal works besides the 'Canterbury Tales' (first printed by Caxton in 1475) are: 'The Boke of the Duchesse' (1369); 'The Assembly of Foules' (1374); 'Troylus and Cryseyde' (1380–2); 'The Legende of Good Women' (1385); 'The House of Fame' (1386). He also translated Boethius, and wrote a treatise on the Astrolabe (1391). He was buried in Westminster Abbey. See Nicolas, 'Life of Chaucer'; Ten Brink, 'Chaucer: Studien zur Geschichte seiner Schriften' (1870); Lounsbury, 'Studies in Chaucer' (1872); Skeat, 'The Chaucer Canon' (1900).

Chaucer, The Student's, a complete edition of the poet, edited by Walter W. Skeat (1895). In addition to the complete text of all the writings of Chaucer, the volume has a Glossarial Index fully adequate to explain words not known to the English reader to-day.

Chauci, kâ'sī, an ancient Teutonic tribe, dwelling between the Ems and Elbe on the shore of the German Ocean. They were a peaceful people and lovers of justice. Nothing is said of them in history after the 5th century.

Chaudesaigues, shōdz-āg ("warm waters"), France, a watering-place in the department of Cantal, 28 miles east-southeast of Aurillac. The warm springs have their rise in a volcanic mountain, and are so copious that the water is used from November to April in heating the town. Besides the five hot springs there are three cold springs. Pop. (1901) 1,070.

Chaudet, Antoine Denis, äṅ-twäṅ dŭ-nē shō-dā, French sculptor: b. Paris 31 March 1763; d. there 19 April 1810. In his 21st year he obtained the first prize of the Academy, and went to Rome, where he studied the masterpieces of the ancients. On his return he became a member of the Academy. His first work was a bas-relief under the peristyle of the Pantheon. Among his other works are 'La Sensibilité,' a young girl astonished at the motion of the sensitive plant, which shrinks from her touch; the statue of Cyparissa, etc. Chaudet also excelled as a painter.

Chaudfontaine, shō-fŏn-tān, Belgium, a village in the province and four miles from Liége, on the Vesdre, with hot springs much frequented in summer. Pop. (1897) 1,811.

Chaudière, shō-dē-ār, a river of Canada, which has its rise in Maine, near the source of the Kennebec, and flows north for 120 miles and joins the St. Lawrence about six miles above Quebec. Between two and three miles above its mouth it forms the Chaudière Falls. Chaudière Lake is an expansion of the Ottawa River just above the city of Ottawa.

Chauffeur, shō-fėr (Fr. a "stoker"). This term has recently come into use in the English language to designate at first the engineer or motorman of a steam-driven road carriage; but

by extension it is now applied to any professional machinist who operates an automobile, electrically or otherwise propelled.

Chauffeurs, shō-fėr, or **Garrotteurs,** gă-rŏt-tėr, an organization of brigands during the Reign of Terror in France. Their headquarters were first in the forest of Orgères, near the city of Chartres, and afterward they infested other parts of the country in bands organized under the leadership of Johann Buckler, surnamed Schinderhannes, until 1803, when the measures adopted under the consulate put a stop to their depredations. They garrotted their victims, and tortured and burned (*chauffé*) their feet to make them disgorge their treasures. While engaged in burglaries they put a black veil over their faces or painted them with soot.

Chaulmugra, châl-mŭg'ra (*Gynocardia odorata*), a tree of the order *Bixaceæ*, which grows in eastern countries, and from the seeds of which an oil is obtained that has been long known and highly valued in India and China as a remedy in skin diseases. The oil has been introduced into Great Britain, and is said to be useful in rheumatism, sprains, etc.

Chaumette, Pierre Gaspard, pē ār găs-pār shō-mĕt, French revolutionist: b. Nevers 24 May 1763; d. 13 April 1794. The opening of the Revolution found him a clerk at Paris. He attached himself to Camille Desmoulins, and soon gained such popularity by his extravagant sansculottism that he was appointed procurator of the commune of Paris. In his zeal he rejected his own Christian name, Pierre, as having been sullied by saintly associations, and styled himself "Anaxagoras." The institution of the tribunal of the Revolution, the decree for a revolutionary army, and the law against suspected aristocrats, were largely due to his efforts. One of his proposals was that all Parisians should wear sabots, another that the Tuileries and Luxembourg gardens should be planted with potatoes. His antics in connection with the "worship of reason" excited the disgust of Robespierre, who devised measures for bringing the whole company of actors under Hébert to the scaffold.

Chaumont, shō-mōn, France, the capital of the department of Haute Marne, on a height between the Marne and the Suize, 145 miles southeast of Paris by rail. It is well built, has a fine town-hall, court-house, communal college, public library, church dating from the 13th century, the ruins of a castle belonging to the counts of Champagne, and an iron bridge of 50 arches on which the railway crosses the Suize. There are manufactures of gloves, cutlery, leather, woolens, sugar, etc.; and a trade in the iron and iron goods of the department. Here was signed, March 1814, a treaty between Great Britain, Russia, Austria, and Prussia, in which these powers pledged themselves to accomplish the overthrow of Napoleon and restore peace to Europe. Philip Le Bon, the first who advocated the use of gas for illumination, in France, was a native, and his memory is honored by a bronze statute. Pop. (1901) town 11,697.

Chauncy, chân'sĭ, **Charles,** Puritan clergyman: b. Yardleybury, Hertfordshire, November 1592; d. 19 Feb. 1672. He was the second president of Harvard College, and the ancestor of all who bear the name of Chauncy (or Chauncey) in the United States. Educated at Westminster and Cambridge, he made the acquaintance of Archbishop Usher, and was appointed professor of Greek at Cambridge. Leaving that position soon after, he took the vicarage of Ware, Hertfordshire. His stern Puritanism involved him in a difficulty with the ecclesiastical judicatories on the publication of the 'Book of Sports,' and the railing out of the communion table. He was imprisoned and fined for his denunciation of these acts of the Church, and recanted, but soon repented of his recantation. He therefore determined to embark for New England, where he arrived a few days before the great earthquake, 1 June 1638. Here he was reordained, and for three years remained in Plymouth as assistant pastor, and then took the pastoral charge of the church in Scituate, Mass. There he remained until the change in the ecclesiastical polity of England, when he resolved to return to his vicarage in Ware, which had invited him home. But the first president of Harvard College, Mr. Dunster, resigning just at that time, the office was offered to Mr. Chauncy and accepted (1654), which station he held until his death. He was not a voluminous writer, and a few theological works and a number of sermons are all that remain of him. He was zealous against wearing long hair, and baptizing the children of non-communicants.

Chauncy, Charles, American minister, descendant of the preceding: b. 1 Jan. 1705; d. 10 Feb. 1787. He graduated at Harvard College in 1721, and was ordained pastor of the First Church in Boston in 1727. He was a copious writer, and published many works; among the rest, a 'Complete View of the Episcopacy,' being the substance of a discussion with Dr. Chandler, of New Jersey; 'Seasonable Thoughts on the State of Religion in New England'; 'Discourse on Enthusiasm'; 'Remarks on the Bishop of Llandaff's Sermon'; 'Mystery Hid from Ages, or the Salvation of all Men'; 'The Benevolence of the Deity.' He was for 60 years the minister of one parish.

Chauncey, Isaac, American commodore: b. Black Rock, Conn., 20 Feb. 1772; d. Washington 27 Jan. 1840. He commenced his career in the merchant service, in which he became distinguished for seamanship, enterprise, and energy. He entered the navy as lieutenant in 1799, and early in 1802 was appointed acting captain of the frigate Chesapeake, the flag-ship of a squadron ordered to the Mediterranean to operate against Tripoli. In the brilliant operations before Tripoli in 1804 he bore a distinguished part. In April 1806 he was promoted to the rank of captain. In the War of 1812 the naval superiority on the lakes became an object of high importance, and Commodore Chauncey, then in command of the navy yard at New York, was appointed to command on all the lakes except Champlain, winning the highest honors in this position. He commanded the Mediterranean squadron 1816–18 and at the time of his death was president of the navy commission.

Chauny, shō-nē, France, a town in the department of Aisne, on the right bank of the Oise, 19 miles west by north of Laon. It has manufactures of glass, sugar, chemicals. etc. Pop. 9,927.

Chaus, kā'us, the native name for the East Indian jungle-cat (q.v.).

Chautauqua, sha-tâ'kwä, a popular educational centre on Chautauqua Lake in the southwestern part of New York State. It is an incorporated town, 165 acres in extent, on the upland terraces of the lake, at a high elevation, although lying in a lowland corner of the State. Chautauqua is 70 miles south of Buffalo, 200 miles north of Pittsburg, and 450 miles west from New York. It is reached by the Pennsylvania and Erie railways. Chautauqua has numerous large and commodious school buildings; several thousand cottages in the woods; an hotel called "The Athenæum"; a few shops or "stores"; a plain college building on a hilltop, with a beautiful lake-environment; a so-called "hall of philosophy," which is a wooden temple with supporting pillars, open to the summer breeze, and seating 3,000 people; and a vast amphitheatre, like a Greek theatre dug out of a hillside, but well roofed, well lighted by electricity, and capable of seating 5,000 or 6,000. For nine months of the year it is a town of 1,000, but during the summer, while the classes are being held, has a population ranging from 30,000 to 60,000.

As an educational institution Chautauqua has become a centre of great importance. It may be considered primarily as an unconscious educational adaptation of the open-air public assembly such as the American mass-meeting or town-meeting, or the religious camp-meeting. The Chautauqua Assembly was established by Lewis Miller in 1874 at Fairpoint, for Bible study and the training of Sunday-school teachers. But the ideal and purpose of the assembly were gradually broadened; and to the specifically religious study a great variety of subjects were added. The religious spirit, however, pervades the work of the assembly. The best exponent of the spirit of the institution was its chancellor, Dr. John H. Vincent. He infused into it the idea that all sound learning is sacred, and that the secular life may be pervaded by religion.

The work done at Chautauqua has been thus summarized in one of the New York State bulletins: "For the many there are popular lectures, concerts, entertainments; for a somewhat less number there are philosophical, scientific, and literary lectures in progressive courses; for the comparatively few are provided means for careful study under able and well-known instructors." The work may be further classified as follows: (1) the college of liberal arts, instruction in languages, mathematics, psychology, political economy, science, etc., by well-known men, continued during the winter by correspondence; (2) school of pedagogy; (3) schools of sacred literature; (4) classes in art, music, physical education, etc.; (5) lecture courses, similar to the university extension lectures, without extra fee; (6) public lectures and addresses by those prominent in various departments; (7) recreative entertainments, concerts, recitals, stereopticon exhibitions, etc.

An important part of Chautauqua's influence is made effective through classes and courses for home study; prominent among these being the Chautauqua Literary and Scientific Circle (C. L. S. C.), founded in 1878. The C. L. S. C. is a well-directed system of home reading in literature and science, carried on in connection with local reading circles, and practically aided by many good suggestions in a monthly magazine called 'The Chautauquan.' The course of reading occupies four years, which are called respectively the Greek year, the Roman, the English, and the American, from the relative prominence given to the history and literature of those four peoples. The text-books on England and the United States, Greece and Rome, and other subjects, social and economic, are prepared by good writers representing American colleges and universities. With the regular courses in history are combined corresponding literary courses and studies in art, religion, and natural science. In the American year, the special subjects are religion, American history, literature, government, diplomacy, social institutions, and physiology.

The entire expense for the required books and the illustrated magazine is about $5 per annum. The text-books are now written by Chautauqua specialists, and published by the assembly. The course of reading is carried on by Chautauquans at home, but once a week they meet in local circles in neighborhoods and villages all over the country and, under the best local guidance they can find, devote an evening to the discussion of topics suggested by 'The Chautauquan' and other private reading. The number of these local reading circles during the past 20 years has been about 10,000, and the total enrollment of Chautauqua readers has been about 250,000. By far the larger number fail to complete the four years' course, but it is estimated that about a half have done consecutive reading for two years. A "saving remnant" of about 40,000 continue to the end and win a simple certificate. The graduates are also encouraged to form local educational clubs and continue special study.

Next in importance to the C. L. S. C. are the "schools," wherein definite class instruction, begun under competent direction at Chautauqua, is continued by correspondence with the professor or representative of the "school" throughout the year. This combined work done in residence and by correspondence may, in a few rare cases, lead to the degree of bachelor of arts or bachelor of science, conferred, however, only after searching tests. The degree-giving power is vested in the regents of the University of the State of New York, whose academic honors are, by State examinations, better guarded than are those of some academic corporations in America. A great variety of regular and advanced work is offered; including courses in history, science, pedagogy, and theology (for which the degree B.D. is given).

The "Chautauqua idea," of which much has been said and written, is best expressed by Bishop Vincent, who says: "Chautauqua pleads for universal education; for plans of reading and study; for all legitimate enticements and incitements to ambition; for all necessary adaptations as to time and topics; for ideal associations, which shall at once excite the imagination and set the heart aglow. . . . A college is possible in every-day life if one choose to use it; a college in house, shop, street, farm, market, for rich and poor, the curriculum of which runs through all of life, a college which trains men

and women everywhere to read and think and talk and do; . . . this is the 'Chautauqua idea.' »

Chautauqua Lake, a beautiful lake situated in Chautauqua County, N. Y. It is 18 miles long and from one to three miles wide, the highest navigable water on the continent, 730 feet higher than Lake Erie and 1,400 feet above the sea-level. Chautauqua was the Indian name for this lake, the shores of which are a natural «divide» between waters which flow northeastward with the St. Lawrence from the Great Lake district and waters which flow southwestward to the Mississippi River and the Gulf of Mexico. On its banks is the village and summer resort of Chautauqua, the centre of a religious and educational movement of large and growing interest. See CHAUTAUQUA.

Chauveau, shō-vō, **Pierre Joseph Olivier,** Canadian statesman and writer: b. Quebec 30 May 1820; d. there 4 April 1890. Among his contributions to literature were many popular poems, including 'Simple Joys,' 'Donnaconna,' 'Letters to M. de Puibusque,' also 'Tour of H. R. H. Prince of Wales in America' (1861), 'Souvenirs and Legends' (in prose and verse) (1877), and 'François Xavier Garneau, His Life and Works' (1883).

Chauveau-Lagarde, lä gärd, **Claude François,** klōd fräṅ-swä, French advocate: b. Chartres 1756; d. 1841. He studied law in his native town and began to practice in Paris shortly before the outbreak of the Revolution. He became celebrated for his eloquent defense of those on trial in the Reign of Terror. He was the advocate of Marie Antoinette at her trial and also of Charlotte Corday. Others of his clients were Brissot and Madame Elizabeth of France. His defense of Mirandola saved the latter from the scaffold. In 1814 he was ennobled by the government of the Restoration and two years later he published an account of the trial of Marie Antoinette and Princess Elizabeth.

Chauvenet, shō-vē-nā', **William,** American astronomer and mathematician: b. Milford, Pa., 24 May 1819; d. St. Paul, Minn., 13 Dec. 1870. He was graduated at Yale in 1839, and became instructor in mathematics at the Philadelphia Naval Asylum in 1841, professor of mathematics and astronomy at the United States Naval Academy in 1845, and professor of astronomy at Washington University, St. Louis, in 1859. In 1862 he became chancellor of the last institution. He wrote 'Spherical and Practical Astronomy,' 'Elementary Geometry,' and similar works.

Chauvinism, shō'vĭn-ĭzm, a French word derived from Nicolas Chauvin, a soldier of the French Republic and of the First Empire. His name became a synonym for a passionate admirer of Napoleon, and the word Chauvinism was formed to signify the almost idolatrous respect entertained by many for the First Emperor, and generally any feeling of exaggerated devotion, especially of patriotism. A vaudeville, 'La Coquarde Tricolore,' in which there was a character named Chauvin, with a song that became immensely popular, fixed the word in the French language. The word is now used to express exaggerated patriotism of an aggressive type, jingoism, etc.

Chaux-de-Fonds, shō-dė-fôṅ, **La,** Switzerland, a town in the canton of Neuchâtel, and nine miles northwest of the town of Neuchâtel, in a deep valley of the Jura. Chaux-de-Fonds and the neighboring village of Locle are the chief centres of watch-making in Switzerland. Pop. 35,971.

Chaves, Francisco de, fräṅ-thēs'kō dā shä'vĕs, Spanish soldier of the 16th century: d. Lima, Peru, 26 June 1541. He was a trusted companion of Pizarro in the conquest of Peru, but disapproved of the execution of the Inca, Atahualpa. About 1539 he was sent out by Pizarro to settle Conchucas, but within a few months was assassinated at the same time as his leader.

Chaves, Brazil, a small town in the province of Para, on the north coast of the island of Marajo, at the mouth of the Amazon. Pop. 8,500.

Chaves, shä'vĕsh, Portugal, the ancient AQUÆ FLAVIÆ, a town of the province of Tras-os-Montes. The fortifications which once defended it are now in ruins. It is situated on the Tamega River, here crossed by a Roman bridge, 12 arches of which remain out of the original 18, and has hot saline springs and baths. It has an interesting church, the burial place of Alfonso I., Duke of Braganza. Linen manufacture is carried on in the town. In 1811, after a violent conflict, Soult obtained possession of the place; and after the defeat of the Cartistas, 18 Sept. 1837, the famous Convention of Chaves was signed here. Pop. 7,500.

Chavica, kăv'ĭ-kạ, a genus of plants, of the natural order *Piperaceæ,* including the common long pepper, Java long pepper, and betel-pepper. The plants of this genus are shrubs very closely resembling those of the nearly allied genus *Piper,* and by some included in it. The leaves of the betel-pepper (*C.* or *P. betel*) form one of the ingredients of the masticatory called betel (q.v.).

Chay-root, chā-, or **Choy-root,** choi-, the roots of a small cinchonaceous plant of Hindustan, the *Oldenlandia umbellata,* extensively cultivated on the Coromandel coast. The roots yield a dye which is used as madder.

Chayote, chī-ō'tā, a climbing vine (*Sechium edule* or *Chayota edulis*), belonging to the *Cucurbitaceæ,* or gourd family. The leaves are strongly three-angled or -lobed, with the broadly cordate base also showing two or four sharp corners. They are deeply concave, have a rough surface with whitish veins, and in color are of a deep fresh green. The pistillate flowers are solitary; the much more numerous staminate flowers are borne on special branches. Pollination takes place through the agency of insects. The ovary is always one-celled, with a single ovule. It is mealy-pubescent when young, becoming spiny with maturity in some varieties. The mature fruits are always more or less compressed, as though built over the large flat seed. In general they are pear-shaped, but vary in their proportions. They weigh from eight ounces to a pound each, and fruits weighing three pounds have been reported. In flavor they resemble summer squash or vegetable marrow.

The chayote is produced in large quantities in Porto Rico for domestic consumption, and it

has recently attained popularity in Australia and Algeria, from which latter country many hundreds of tons are annually shipped to Paris and London. It bears shipment well, an eight- or ten-day journey not affecting its condition. It is in common use as a vegetable in Madeira, Mexico, Central America, the West Indies, California, and Louisiana. It was first reported in Europe by Francisco Hernandez, who found the plant in Mexico about 1560, and described the fruit as suggesting the flavor of roasted oysters, sweet potatoes, or chestnuts. It produces tuberous roots which resemble the yam or cassava. In Mexico the young shoots are sometimes boiled and eaten like asparagus. Both the fruit and the vine are used as fodder for cattle and hogs, and the vines are sometimes used for fancy basket-work and the manufacture of women's hats. The flowers yield an abundance of nectar, and are said to be of value to bees. As an ornamental vine the chayote takes high rank, a single vine being reported as covering a fence 6 feet high and 50 feet long in a few months.

The fruit is eaten in a variety of ways,—boiled and seasoned with pepper and salt; parboiled and fried; stuffed and baked: in puddings, tarts, or fritters, etc.

The name appears to be a form of the Aztec word *chayotl,* meaning "a head bristling with spines" or "a squash covered with thorns." The popular names are in many cases corruptions of the Aztec term, as the Porto Rican *tayote;* but in the West Indies and Australia it is known as *chocho;* in Louisiana as *mirliton;* and as "vegetable pear" in some parts of the British West Indies.

Chazars, chä'zärz, or **Khazars,** a people of the Finnic stock known in the 7th century on the shores of the Caspian; in the 9th century their kingdom occupied the southeast part of Russia from the Caspian and the Volga to the Dnieper. Their capital was long at Astrakhan, called by them Balandshar. They were singularly tolerant of all religions, Jewish, Christian, and Moslem; and a large part of the nation formally adopted the Jewish faith from Jews who fled from the persecutions of the Emperor Leo. It is not improbable that the modern Jews of Russia have at least an admixture of Chazar blood. Cyril converted many to Christianity in the 9th century. The power of the Chazars was broken in 965 by Sviatoslav. In the early part of the next century the destruction was completed by the Byzantine emperors and the Russians.

Chazy (shā-zē) **Stage,** in American geology, the limestone beds, 725 feet thick, typically developed at Chazy, N. Y. The name was first applied by the New York Geological Survey. The Grenville limestone of the Ottawa region in Canada corresponds to it. The Chazy limestone was laid down around the border of the old Pre-Cambrian land in Canada and New York in older Ordovician time. It succeeds the Calciferous and is succeeded by the Trenton. Though a well-marked division in New York and Canada it is not determined farther west, but the St. Peter's sandstone, which underlies the Trenton limestone in Iowa, Michigan, and Wisconsin, may be of Chazy age. See ORDOVICIAN.

Che-Kiang, chē-kē-ăng', or **Che-Chiang,** China, a maritime province lying north of Fu-kian and south of Kiang-se and including the Chusan archipelago; area, 39,150 square miles. The province is of great commercial importance, containing three treaty ports, Ning-Po, Wan-Chau (Wen-Chow), and Hang-Chau (Hang-Chow) all of which are to be connected with Shanghai by a projected railway under British control. The surface is mountainous and traversed by rivers, notably the Tsien-Tang and Ta-Kia, which run down to the Eastern sea. The Grand Canal, which has its gateway in Che-Kiang, affords the only means of internal communication apart from an extensive system of narrow foot roads. Trade in silk and tea is well developed, this province being, with Chiang-Su and Fu-Shien, the first to contain a treaty port, that of Ning-Po, opened in 1844. Beside tea and silk the province produces cotton and sedge for hats and mats. It imports opium, cotton and woolen goods, tin and iron, kerosene oil, indigo and sugar. Coal is found in the north and iron ore in the south.

Che-Kiang is famed for its native system of education. It contains the great religious and literary centre of China, Hang-Chow (not to be confused with Hang-Kow or Han-Kow), where thousands of candidates yearly resort for the public examinations. Hang-Chow is also the capital of the province, which is ruled by a viceroy. Marco Polo visited Che-Kiang in the 14th century, when it contained beautiful temples, now in ruins. The most magnificent architectural feature of the province is the temple of the Queen of Heaven, dating from 1680. Che-Kiang suffered severely during the Tai-ping rebellion in 1861. The Italians in 1900 laid claim to part of Che-Kiang as a sphere of influence, and demanded the privilege of establishing a port on the coast to be called San Mun. There are thousands of native Christians. The last census (1882) gave a population of 11,588,692. The population in 1900 was estimated at 15,000,000. The foreign population is estimated (1900) at 2,750.

Cheap'side (M. E. *chepe,* market) a thoroughfare of London, running east and west through a part of the city that was in former times a large, open common. In the Middle Ages Chepe was the chief seat of the London retail trade.

Cheat. See BROME GRASS.

Cheat River, a river rising in the Alleghanies in West Virginia, and after the union of its four forks, flowing north and then northwest to empty into the Monongahela a few miles beyond the boundary line of Pennsylvania. Its length is about 150 miles.

Cheboygan, Mich., city and county-seat of Cheboygan County, on Lake Huron, and on the Michigan Central and the Detroit & M. R.R.'s, at the eastern end of the Straits of Mackinaw. It became a city in 1886 and is governed by a board of 10 aldermen. It is an agricultural centre, a popular summer resort, and manufactures lumber, paper, leather, and furniture. It has nine churches and an excellent public school system. Pop. (1900) 6,489.

Check, or Cheque, a draft or bill on a bank, payable on presentation. A check may be drawn payable to the bearer, or to the order of someone named; the first form is transferable

without endorsement and payable to any one who presents it; the second must be endorsed, that is the person in whose favor it is drawn must write his name on the back of it. Checks are a very important species of mercantile currency wherever there is a well-organized system of banking. The regular use of them for all payments, except of small amount, makes the transfer of funds a mere matter of cross-entries and transferring of balances among bankers, and tends greatly to economize the use of the precious metals as a currency.

Check'erberry. See GAULTHERIA; PARTRIDGE BERRY.

Checkers, Chequers, or Draughts, a game of skill played by two persons with a checkered board divided into 64 squares, which are alternately colored black and white or black and red, and with 24 small disks of wood or bone technically termed "men," 12 being usually colored black, and the others white or red. At the beginning of the game each player places his men on alternate squares (of the color agreed on) of the first three rows of his side of the board, which is so placed between the two players that each one has at his right hand one diagonal line of two squares of the color chosen to play on (the rule being technically known as "double corners at the right hand"). This leaves the two middle rows of the board unoccupied. The privilege of the first move is determined by lot or in any manner agreed upon; after the first game of a series the first move passes alternately.

The first player advances any one man in his foremost row one square diagonally; his opponent likewise moves a man; and so on alternately until one player exposes a man to capture by leaving a vacant space behind him on a diagonal line on which stands next him a man of the opponent. Capture is effected by the leaping of such "enemy" over the man so exposed and occupying the vacant space, on which the man so taken is removed from the board. For failure to seize the opportunity to take a man prisoner, the opponent may compel the capture of the piece, or he may remove the delinquent from the board,—an operation known as "huffing." (Under certain rules of the game, the "huff" carried with it the privilege of the next move. This is not in common use at the present day. The player who first puts out of action all his opponent's men wins the game. Putting out of action may be accomplished either by capture or by so hemming in the opponent's men that they cannot move. If a player succeeds in getting a man across the whole board into the enemy's rear line of squares, it thereby becomes a "king," with the privilege of moving diagonally in either a backward or forward direction. A "king" is usually distinguished or "crowned" by placing a disk of the same color on its top. More than one man can be captured at a time if they stand in such order on the board that the series consists of a man and a vacant square alternately, and this series may be in a straight diagonal, or in any branching diagonal therefrom, provided the progress of the capturing man be never retrograde,—always toward the king line.

Checkers is a very ancient game. A form of it, of great antiquity in China, is known by the appropriate name of "the game of circumvention." It was well known by the Egyptians, Greeks, and Romans, and antiquarians have recognized it as one of the games indulged in by the, practically, recently discovered New Zealanders, who for thousands of years must have been cut off from all Asiatic or European influences. The first English publication relating to it was published in 1566, but the most important early book was Wallet's, published in Paris in 1668. The leading authority is Joshua Sturgis, 'Guide to the Game of Draughts.'

For laws, hints, and diagrams of the American game, as well as for references to the Polish and Spanish varieties, see A. Howard Cady, 'Checkers, a Treatise on the Game.'

Cheddar, chĕd dẽr, England, a village in Somerset County, at the foot of the Mendip Hills, 18 miles southwest of Bristol. The dairies in the neighborhood have long been famous for the excellence of their cheese, which is made from the whole milk, and the whey skimmed off, heated, and added to the curd. Pop. about 2,000.

Cheddar Cheese. See CHEESE.

Chedorlaomer, kĕd-ôr-lā-ō'mẽr, a king of Elam, mentioned in the 16th chapter of Genesis as one of the confederates of Tidal, "King of Nations," in the expedition against the king of Sodom and other rebellious tributaries. See ABRAHAM.

Cheduba, chĕ-doo'ba or chĕd'oo-ba, or **Man-aung,** Burma, an island in the Bay of Bengal, about 25 miles off the coast of Aracan, forming a township of Kyauk-pyu district; area, 240 square miles. On the island is a town of the same name. Cheduba is well wooded and fertile, but unhealthy. On the northwest coast inflammable gasses are discharged in some quantity. The principal product is an excellent tobacco. Rice, indigo, pepper, are also produced; and petroleum is found. Pop. 24,000.

Chee-foo, chē-foo', or **Chafoo** (properly the name of the European colony of the Chinese town of Yen-Tai), a treaty port on the north side of the peninsula of Shan-tung, at the entrance to the Gulf of Pechili, in which it is the only port that remains open throughout the winter. The foreign quarter is in some sense a colony of Shanghai, and, having the best climate of all the treaty ports, it is much resorted to by convalescents. The Chinese town has fortifications and a signal-station. As a market for foreign manufactured goods, particularly English cotton yarn and American sheetings, Chee-foo is of great importance. The other principal articles of import are sugar, paper, iron, edible seaweed, matches, and opium. The chief exports are silk, straw-braid, bean-cake, beans, and vermicelli. The Chee-foo Convention, which settled several disputed points between China and Great Britain, and extended certain commercial advantages to the latter country, besides throwing open four new treaty ports, was signed 13 Sept. 1876. Since then the "open door" policy of the United States has tended to widen the relations of this port with the rest of the commercial world. In 1899 American merchandise found a market in Chee-foo to the extent of over $3,000,000. The port was the scene of a naval demonstration in 1900, when British and American warships threatened to bombard the forts if their hostile attitude was

not abandoned. There were 150 missionaries in the city, whose rescue from peril was thus effected. Pop. about 32,000.

Cheecha, chē'chä. See GECKO.

Cheer'yble Brothers, two merchants introduced in Charles Dickens' novel 'Nicholas Nickleby.' They are twin brothers of a very genial and liberal disposition and become staunch friends of the hero. It is said that the novelist reproduced in these characters two cotton-spinners of Manchester.

Cheese and Cheese-making. Cheese is the curd of milk, including principally the casein and fat, coagulated, cooked, drained, and pressed into solid form. Nearly all cheese is made from cows' milk, and originally it was a product of the farm. Now by far the greater portion is made in factories especially fitted for the purpose. The standard factory-made American cheese is practically identical with the English Cheddar cheese, and is often so called.

In the manufacture of cheese a milk rich in fat is preferred, the cheese being nearly all fat and casein. By artificial souring of the milk coagulation is produced, so that the whey or watery part may be separated from the curd. The curd is the raw material operated on; the casein is a proteid substance that may be compared to lean meat, and is coagulated by acid. It is that part of the curd that remains when the fat, sugar, and ash are extracted. The first process of manufacture is to heat the milk (preferably sweet milk) to about 84° F. It is then tested with rennet for ripeness. A graduated cup provided with a fine hole in the bottom is filled with milk and a little rennet added. Rennet, in its commercial form, is a preserved extract from the fourth stomach of a calf. Being of a peptic character it tends to coagulate the milk, and if the milk in the cup coagulates in from 17 to 20 seconds it is sufficiently ripe for treatment. Enough rennet is then added to the supply of milk to coagulate the whole in 25 or 30 minutes. The proportions vary with conditions, but about four ounces of rennet extract to 100 gallons of milk is perhaps an average quantity. When the milk is coagulated, the solid portion or curd in the vat is separated from the watery portion, by allowing the latter to drain off. This waste usually become food for pigs. Gang knives are then brought into use, to cut the curd into cubes of a third of an inch or more, the knives being set a little less than half an inch apart and passed through the curd horizontally and perpendicularly. After cutting, the curd is gently agitated to prevent settling. This allows the curd to shrink, and tends to expel a portion of the whey. The stirring may be done with a curd-rake, but factories more commonly employ what is termed an automatic curd-agitator, which is attached to the vat and driven by steam power.

The mass of curd is next heated very slowly to about 92° F. This cooking process may continue several hours, lasting until the operator finds that the curd will string about a quarter to a third of an inch on a hot iron. The whey is then drawn off. The curd is next turned and piled, to rid it of the excess of moisture. When deemed sufficiently solid it is ground and salted. The grinding may be done in one of several kinds of mills, a common form having two cylinders with teeth rotating toward each other, which operation picks the curd to pieces.

After grinding, the curd — or cheese, as it may now be called,— is dipped and put into hoops to give it form for pressing. Common sizes of hoops are 14½ × 10 and 13½ × 6 inches. An iron bandage or rim is placed about the hoop to give it solidity, and a cloth wrapped about it to keep the cheese together and secure cleanliness. Pressure is then applied, at first lightly, and then increased, the cheese being usually turned over during the operation. The pressure is maintained for 16 to 18 hours, after which the cheese is ready to be cured.

Curing-rooms are built both above and below ground, the latter being preferred as being easier to maintain at a cool temperature. High temperature is very deleterious to cheese, diminishing its value by melting and leaking of fat, while the texture and flavor are also impaired. A temperature below 65° F. should always be maintained in the curing-room, and 40° is better. Ventilation must be provided, and the usual arrangement is an upright draft-pipe, run high enough to catch the wind, and with a vane at the top to turn the mouth of the funnel to the wind. The process called ripening takes place in the curing-room, determining the particular flavor of the cheese. The ripening is caused by bacteria, as is proven by making cheese from sterilized milk, in which case it retains the flavor of new-made cheese for a very long period. Dairy bacteriologists are endeavoring to isolate the different species of cheese bacteria, that they may be cultured, and incorporated with the milk in starting the cheese-making. In this way the maker would be certain of securing a particular flavor for his cheese, whereas now it is a matter largely of chance as to what bacteria predominate.

The method described above is that followed in practically all the factories of the United States and Canada. More than four fifths of the cheese manufactured is of this character. The remainder is farm-made, or made in urban dairies, or else is manufactured by some other process in imitation of some foreign cheese, as the Swiss Gruyère or Emmenthal, Limburger, Neuchâtel, Brie, etc.

The constituents of milk which determine its value for cheese-making are the fat and casein. Milk may contain from three to eight per cent of fat and from two to five per cent of casein, the average proportion being about a pound of fat to two thirds of a pound of casein. Since the cheese yield increases with the fat in the milk, managers of cheese factories have encouraged the production of milk rich in fat, and perhaps this knowledge is largely responsible for the fact that in 1900, in the factories of the United States, 100 pounds of milk made almost 17 per cent more cheese than it did in 1890.

The analysis of cheese is largely a matter of securing a correct average, as a cheese varies in properties at the centre or at the circumference. A wedge is generally taken as a sample, cut from the centre to the rind, or sometimes a plug, taken at one third the distance from the rind to the centre. The usual test of cheese is to find the proportion of fat. For this purpose the Association of Official Agricultural Chemists of the United States Department of Agriculture have adopted the following method:

Fig. [1] Slender Lori. [2] Foot of do. [3] Skull of do. [4] Black-fronted Lemur. [5] Skull of Flying Lemur. [6] Aye-Aye. [7] Flying
[13] Skull of Horse-shoe Bat. [14] Skull of common Bat. [15] Hedge-hog. [16] Skull of do. [17] Mole. [18] Skull of do.

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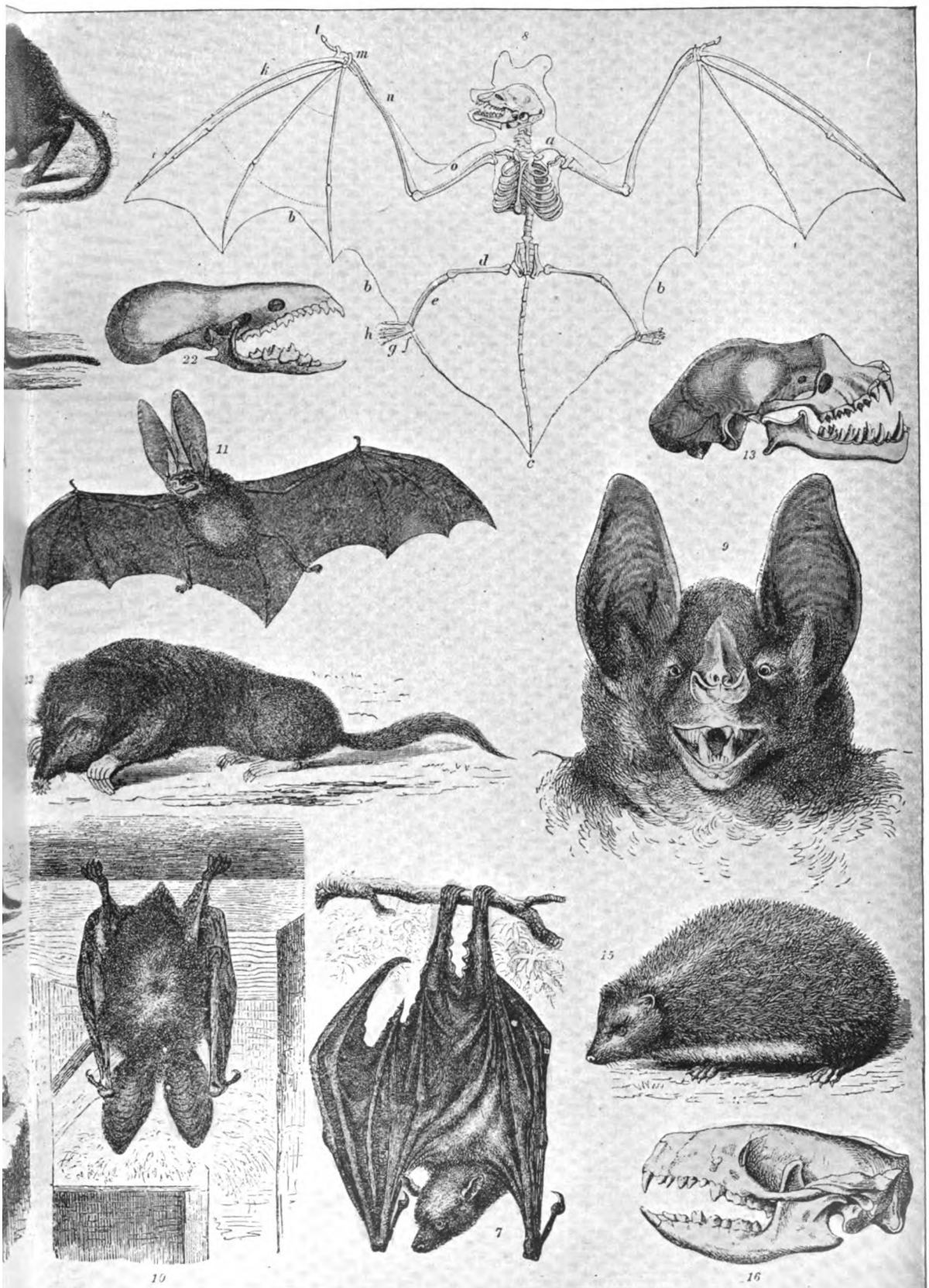


Flying Fox. [8] Skeleton of a Bat. [9] Head of Vampire Bat. [10] Long-eared Bat hanging. [11] The same flying. [12] Common Bat crawling.
[13] do. [19] Common Shrew. [20] Skull of Water Shrew. [21] Elephant Shrew. [22] Skull of Alpine Shrew. [23] Canadian Mole.

Mau

For the estimation of fat in cheese about 5 grams should be carefully weighed, and transferred as completely as possible to a test bottle. From 12 to 15 c.c. of hot water are then added and the bottle shaken at intervals, keeping it warm until the cheese has become softened and converted into a creamy emulsion. This may be greatly facilitated by the addition of a few drops of strong ammonia to the contents of the bottle. After the contents of the bottle have become cold the usual amount of acid should be added and the bottle shaken until the lumps of cheese have entirely dissolved. The bottles are then placed in the machine and whirled, the test being completed in the same manner as with milk. To obtain the percentage of fat the reading should be multiplied by 18 and divided by the weight in grams of cheese taken.

Some cheese is colored by the makers, though the best requires no coloring. Saffron and arnotto are used for this purpose. Various herbs are also incorporated with the milk at the time of making the curd, to alter the appearance or flavor of the cheese. Common among these are sage leaves, marigold, and parsley.

A small proportion of the cheese used in the United States is imported. From 5,000,000 to 7,000,000 pounds a year of Swiss cheese are brought in, also some from France, Germany, and England. Such cheese is usually named from the locality whence it comes, though sometimes the name becomes distinctive of a special make, as the Roquefort, which is made from the milk of sheep, mainly the Larzac breed; the Kachkaval (Bulgarian), a white cheese made of sheep's milk; the Parmesan (Italian), which is kept three or four years and polished with linseed oil and charcoal till it shines like ebony; the Limburger (German), characterized by its strong odor; and the Brie (French), which is also odoriferous.

In 1900 there were 3,299 cheese factories in the United States, and 571 factories making both butter and cheese. New York and Wisconsin are the greatest cheese-producing States, their aggregate product being over two thirds the total of the whole country. In 1900 the 1,314 cheese factories of New York produced 127,795,195 pounds, and the 1,286 factories of Wisconsin 77,748,680 pounds. Ohio has 320 factories; Pennsylvania, 140; Michigan, 136; Illinois, 123; Iowa, 89; Vermont, 71; Minnesota, 53, while no other State has as many as 40. The total factory product of the whole United States in 1900 was 281,972,324 pounds; to this should be added 16,372,330 pounds made on farms, and 662,164 made in urban dairies, making a total cheese product for the year of 299,006,816 pounds. Valued at 10 cents a pound, which is an average wholesale price, it was worth nearly $30,000,000.

Previous to 1850 practically all the cheese made in this county was a farm product. During the period from 1850 to 1860 factories were established in New York State at the rate of three or four a year, and from the latter date the growth of the industry in New York was rapid, as follows: 1860, 17 new factories; 1861, 18 more; 1862, 25; 1863, 111; 1864, 210; 1865, 52; 1866, 46. Since that date the growth has been a normal one. A comparison of census figures for 1890 and 1900 affords a fair idea of the development. In 1890 the milk consumed by the factories of the United States amounted to 2,684,550,517 pounds, and in 1900 it was 2,741,898,114, an increase of only 2.1 per cent. The cheese made from this milk, however, showed a gain in quantity of 18.5 per cent, the product of 1890 being 238,035,065 pounds, against 281,972,324 for 1900. The cost of production increased more than the product, being 30.3 per cent, or $16,320,590 for 1890, and $21,258,712 for 1900. The value of the cheese product for the years named showed the greatest increase in percentage, namely, 33.9, the totals being $19,802,957 for 1890, and $26,519,829 for 1900.

The average cheese factory product, as shown by the United States census of 1900 is 72,842 pounds, representing about 730,000 pounds of milk, from about 290 cows. The milk from 1,130,000 cows for a little more than half the year supplies the total for the factories of the country.

During the decade from 1890 to 1900 only three States showed an increase in the farm-made cheese product,— Wisconsin, Pennsylvania, and California. The latter State produced 4,249,388 pounds of farm-made cheese in 1900, as against 2,676,543 pounds of factory make.

Cheese is lower in price during the summer months than at other seasons. Following are the wholesale quotations during the year 1901:

Month	New York		Cincinnati		Chicago		St. Louis	
	high	low	high	low	high	low	high	low
January	11¼	12	11	12	10½	11½	11⅛	11½
February	12	12½	11½	12	11½	11½	11	11½
March	12	12½	11½	12	11	11¾	12	12
April	11½	12½	11	12	11½	11¾	11	12
May	8½	9½	8½	12	10½	11¾	10	11
June	9	9¾	8½	9½	9	10½	10	10¾
July	9	9½	8½	9½	9½	10¼	10	11¼
August	9⅜	9⅞	9	10	10	10¾	11	11½
September	9½	10¼	9½	10	10	10¾	10½	11½
October	10¼	10¾	9½	10½	10	10¾	10½	11½
November	10¼	10¾	10	10½	9¾	10¾	10¾	11¼
December	10	11¼	10	10½	10	10¾	10¾	11¼

For further information regarding cheese see the United States Census reports, and reports of the New York State Agricultural Experiment Station and the Wisconsin Agricultural Experiment Station; also the year-books of the Department of Agriculture.

CHAS. H. COCHRANE.

Cheese-fly, a small, black, dipterous insect (*Piophila casei*) bred in cheese, of the same family to which the house-fly, blow-fly, etc., belong. It has a very extensible ovipositor, which it can sink to a great depth in the cracks of cheese, and lay its eggs there. The maggot, well known as the cheese-hopper, is furnished with two horny claw-shaped mandibles, which it uses both for digging into the cheese and for moving itself, having no feet. Its leaps are performed by a jerk, first bringing itself into a circular attitude, when it can project itself 20 to 30 times its own length.

Cheese-hopper. See CHEESE-FLY.

Cheese-rennet. See BEDSTRAW.

Cheeta, Cheta, Cheetah, or **Hunting-Leopard,** a large tropical cat (*Cynælurus jubata*) forming an offshoot of the *Felidæ*. Its length and slenderness of limb give it a fleetness in running short distances, such as is probably attained by no other large mammal. Its claws are short, blunt, and practically non-

retractile. It pursues its prey by chase rather than by stealth; and ordinarily exhibits more dog-like than cat-like qualities, among these being great docility. It can, however, stealthily come upon its prey if occasion demands. It is about the length of a leopard, but stands much higher, is rufous or tawny in color, spotted with black, except on the throat. It is commonest in the African jungles, and thence is more sparsely distributed to India. In India it is tamed and trained by the natives as a hunter. It is treated like a falcon, leashed, hooded, and kept blindfolded until the game is in sight, when it is loosed and darts upon the quarry, which it drags down and holds until the huntsman comes. The ancient monuments show that this leopard was employed by the Assyrian and Egyptian sportsmen of remote antiquity; and it is known that in the 14th century the returning Crusaders introduced the cheeta into Europe where it was used for some centuries.

Cheever, Ezekiel, American school teacher: b. London, Eng., 25 Jan. 1614; d. Boston, Mass., 21 Aug. 1708. He received a good classical education and emigrated to America in June 1637, in order to enjoy religious freedom. With Davenport and Eaton he was one of the founders of New Haven, Conn., where he married and taught school in his own house, Michael Wigglesworth being one of his pupils. About 1650 he removed to Ipswich, Mass., where he was the first master of its Free, or Grammar School; in 1661 he went to Charlestown in a similar capacity, and in 1670 was called to Boston as head master of its free school, and remained there the rest of his life. His 'Latin Accidence: an Elementary Grammar of the Latin Language,' was for a century the most popular introductory Latin text-book used in New England, 18 editions having been printed before the Revolution (10th ed. 1767; 20th ed. Salem 1785). He also wrote 'Scripture Prophecies Explained, in Three Short Essays,' an edition of which was printed at Boston 1757. His funeral sermon was preached by his pupil and friend, Cotton Mather.

Cheever, George Barrell, American clergyman: b. Hallowell, Me., 17 April 1807; d. Englewood, N. J., 1 Oct. 1890. He was editor of the New York 'Evangelist' from 1845 to 1846, and at different times connected with the New York 'Observer' and 'Independent.' He was an able and vigorous writer and speaker, and the author of a large number of works in prose and verse. Among his publications are: 'Studies in Poetry' (1830); 'God's Hand in America' (1841); 'Poets of America' (1847); 'Windings of the River of the Water of Life' (1849); 'The Voice of Nature to Her Foster-Child, the Soul of Man' (1852); 'Lectures on the Life, Genius, and Insanity of Cowper' (1856), arguing that Cowper's religious terrors proved him sane instead of insane; and 'God Against Slavery, and the Freedom and Duty of the Pulpit to Rebuke It' (1857). One of his most effective works was 'Deacon Giles' Distillery.'

Cheever, Henry Theodore, American prose writer and clergyman, brother of the preceding: b. Hallowell, Me., 6 Feb. 1814; d. Worcester, Mass., 13 Feb. 1897. His writings were popular, and include: 'The Island World of the Pacific' (1852); 'Short Yarns for Long Voyages' (1855); and 'Correspondences of Faith and Views of Madame Guyon' (1886).

Chehalis (chē-hā'lĭs) **River,** Washington, in the southwestern part of the State. It has its rise in Lewis County, flows north-northwest and through Chehalis County, into Gray's Harbor. Its length is 125 miles, and is navigable for light steamers some distance from the mouth.

Cheilognatha, or **Chilognatha,** kī-lŏg'na-tha, one of the two orders of *Myriapoda,* including the millipeds and other forms. See MYRIAPODA.

Cheilopoda, or **Chilopoda,** kī-lŏp'ō-da, one of the two orders of *Myriapoda,* represented by the centipeds. See MYRIAPODA.

Cheiromancy, or **Chiromancy,** kī'rō-măn-sĭ. See PALMISTRY.

Cheiromys, kī-rō'mĭs. See AYE-AYE.

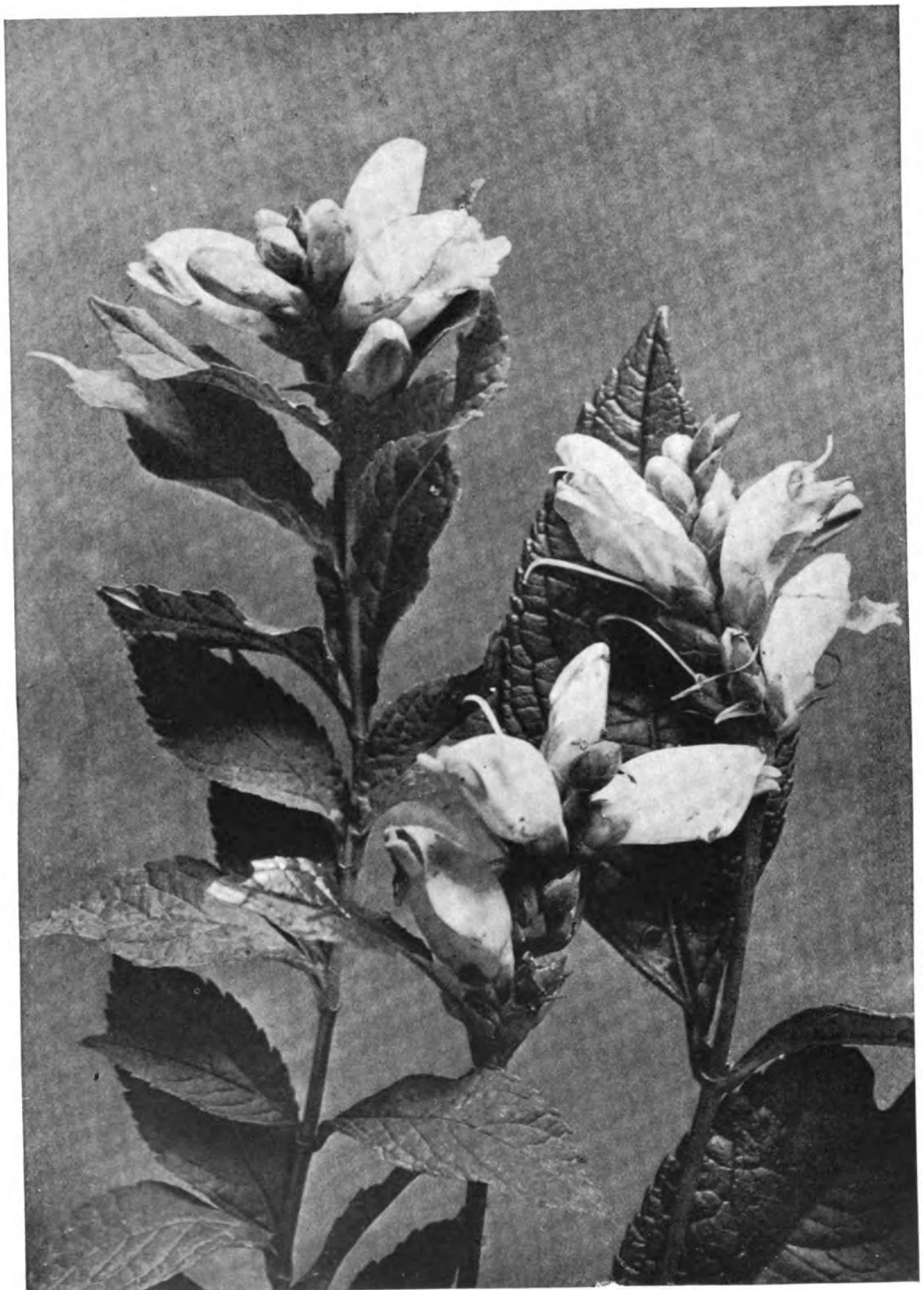
Cheiroptera, an order of mammals, the bats, closely related to the insectivores, and characterized by the immense extension of the forelimbs so as to form wings, and by other adaptations of the skeleton for an aërial life. The order is divided into two groups: *Megacheiroptera* and *Microcheiroptera.* The former consists wholly of the great fruit-eating bats of the Old World tropics; the latter contains all the remaining families. They are separated principally by dental features. See also BATS.

Cheirotherium, kī-rō-thē'rĭ-ŭm. See LABYRINTHODONTA.

Cheke, chēk, SIR **John,** English scholar: b. Cambridge 16 June 1514; d. London 13 Sept. 1557. He was educated at St. John's College, Cambridge, and made regius professor of Greek. In 1544 he was appointed tutor to the future Edward VI., and appears likewise to have assisted in the education of the Princess Elizabeth. On the accession of Edward he was knighted, became secretary of state in 1553, and was also a privy-councilor. On the king's death he supported Lady Jane Grey, and was committed to the Tower. After a few months, however, he was set at liberty and settled in Strasburg; but his connection with the English Protestant Church there gave offense to the Roman Catholics in England, and his estates were confiscated. He supported himself by teaching Greek, but in 1556, having been induced to visit Brussels, he was arrested by order of Philip II. and sent prisoner to England. Under threat of the stake he recanted, and received the equivalent of his forfeited estates. His chief distinction was the impulse given by him to the study of Greek.

Chel-ab-ku-kil, or **Ab-ku-kil-chel,** an Indian priest of Yucatan who flourished in the 15th century. His name is mentioned in almost every Yucatanic legend, and fragments of history composed by him are found in documents of the missions of Yucatan and Central America.

Chelan (chē'lăn) **Lake,** Washington, in the mountains of Okanogan County, 70 miles long, about 3 miles wide, and the largest lake in the Northwest. Its chief inlet is Stehekin or Pierce River, on which, about three miles distant from the lakes, are the famous Rainbow Falls, 300 feet high. The outlet is Columbia River. Chelan, Moore, Stehekin, and Johns, towns on its banks, are summer resorts.



Photograph by J. Horace McFarland Co.

CHELONE (TURTLE-HEAD).

May

Chelard, shĕ-lär, **Hippolyte André Jean Baptiste,** French musician and composer: b. Paris 1 Feb. 1789; d. Weimar, Germany, 12 Feb. 1861. After studying in the various musical centres of Europe, he brought out his first comic opera, 'Casa da Vendere,' in Naples in 1815. In 1816 he settled in Paris as a teacher of music and violinist. In 1827 his lyrical opera, 'Macbeth' (with words by Rouget de Lisle) was very successful, and procured for him the place of chapel master to the king of Bavaria. He produced other operas, cantatas, etc.

Chelléan, shĕl-lā-ăn, this name is given by French archæologists to certain leaf-shaped flint implements found near Chelles in the department of Seine-et-Marne, and supposed to be the oldest relics of prehistoric man in Europe. The name is also given to the epoch, early Pleistocene, in which the makers, who were of the Neanderthal, lived. The climate then was warmer and more moist than now, so much so that the hippopotamus and rhinoceros inhabited Europe. It is impossible to say what was the equivalent of the Chelléan epoch in the United States, though, perhaps, it was equivalent to one of the earlier retreats of the continental ice sheet in the glacial period. See GLACIAL PERIOD; MAN; PLEISTOCENE.

Chelles, Jean de, zhŏn dė shĕl, French architect and sculptor of the 13th century. He is best known for his work on the southern portal of Notre Dame in Paris. This beautiful entrance remains as it was constructed in 1257.

Chelmonski, chĕl-mŏn'skē, **Joseph,** Russian painter: b. Varsovia. He studied in Paris under Gerson, and has made a reputation by his landscapes and figures.

Chelmsford, chĕmz'fėrd, **Frederic Augustus Thesiger,** 2D BARON, English general: b. 31 May 1827. Entering the army in 1844, he served in the Crimea and through the Indian mutiny. As deputy adjutant-general he served in the Abyssinian campaign, was made aide-de-camp to her Majesty, and adjutant-general to the forces in India (1868–76), and in 1877 was appointed commander of the forces and lieutenant-governor of Cape Colony. He restored Kaffraria to tranquillity, and was given the chief command in the Zulu war of 1879. After great difficulties with the transport, and some disasters, such as those of Isandhlwana and Intombi, he gained the decisive victory of Ulundi on 4 July, before the arrival of Sir Garnet Wolseley, who had been sent to supersede him. On his return to England he became lieutenant of the Tower, a post which he held till 1889. He was promoted to the rank of lieutenant-general in 1882, and in 1888 was created a general. In 1893 he went on the retired list.

Chelmsford, England, a municipal borough and capital of the county of Essex, 29 miles northeast of London, situated at the confluence of the Chelmer and Cann. There is a good municipal water supply, and the streets are lighted by electricity. The church of St. Mary is a fine old building of the 14th or 15th century. Among the public buildings are the corn-exchange and the shire-hall containing the courts of assize. There are manufactories of agricultural implements, electric lighting, and wireless telegraphy works; and a considerable trade in corn and malt is carried on. On the banks of the Chelmer are several large flour-mills. The town gives name to a parliamentary division of the county. The Romans had a station on the site of Chelmsford, and Roman remains have been found in the neighborhood. Pop. (1901) 12,580.

Chelone, kē-lō'nē, in Grecian mythology, a nymph who, having failed to be present at the marriage of Zeus and Hera, and having ridiculed their nuptials, was plunged with her house by Hermes into the river on whose banks she dwelt, changed into a tortoise, and thus condemned for ever to carry her house upon her back.

Chelonia, kę-lō'nĭ-ą, or **Testudinata,** tĕs-tū-dĭ-nā'tą, an order or sub-class of *Reptilia* (q.v.) containing the turtles and tortoises, and one of the most sharply defined groups of vertebrates. The body is enclosed in a more or less well developed bony box, from which the head, neck, tail, and two pairs of limbs protrude, and into which they may be completely retracted in some tortoises and terrapins. This box is a unique feature among reptiles and is divided into a dorsal shield or carapace composed of numerous dermal bones usually arranged regularly and supported on the ribs and vertebral spines, and a ventral shield or plastron likewise composed of dermal bones, among which are incorporated the clavicles and interclavicle. Both carapace and plastron are usually encased in horny plates, which do not correspond to the bony pieces. Except for the head and neck, which are flexible, the vertebræ are immovably ankylosed with the carapace. The skull is very compact, with a small brain cavity, and exhibits many structural peculiarities, of which two of the most apparent are the complete fixation of the quadrate bone, and the substitution of horny cutting plates for teeth on the margins of the jaws. Both shoulder and pelvic girdles are permanently enclosed within the shell, and the latter is often firmly united to both carapace and plastron. The limbs may be flattened paddles in the sea turtles, or true walking legs with free toes in the other groups. All chelonians have well developed lungs; but some aquatic forms have additional respiratory organs in the form of vascular areas and papillæ in the pharynx and œsophagus. Without any known exceptions, they are oviparous, and, after burying the eggs in the earth, allow them to be hatched by the warmth of the sun. Except in the colder regions turtles are found throughout the world, and are mostly inhabitants of fresh water, though a considerable number are terrestrial and a few marine. Between 200 and 300 living, and a great many extinct species are known, many of the latter belonging to families not represented in the recent fauna. The chelonia are divided into four sub-orders:

1. *Athecæ,* in which the carapace is of leathery consistency and is supported by numerous small, irregular, separate bones free from the ribs. There is one family (*Dermatochelydidæ*), containing the leather-turtle (q.v.).

2. *Trionychoidea,* with a true carapace composed of dermal bones united to the ribs, but covered by a leathery skin, and lacking the marginal bones; the pelvis is free from the plastron. There is one family (*Trionychidæ*), the soft-shelled turtles (q.v.).

3. *Cryptodira,* in which the carapace is covered with horny plates and provided with marginal bones, and the pelvis is free from the plastron. It embraces the following families: *Chelonidæ,* including marine turtles, as the green, loggerhead and tortoise-shell turtles (qq.v.); *Testudinidæ,* land-tortoises and gopher tortoise (qq.v.); *Chelydridæ,* snapping-turtles and alligator-turtles (qq.v.); *Cinosternidæ,* terrapins and box-turtles (qq.v.); and several others confined to the tropics of both hemispheres.

4. *Pleurodira,* in which the carapace is similar to that of the *Cryptodira,* but the pelvis is ankylosed to the plastron, and the neck folds in a horizontal instead of a vertical plane. They are all inhabitants of fresh waters in the tropical parts of both the Old and New Worlds. Representative families are the *Pelomedusidæ,* tartaruga (q.v.) and *Chelydidæ,* matamata (q.v.).

Consult Gadow, 'Amphibia and Reptiles,' and Baur, in a bulletin of the United States National Museum.

Chelsea, chĕl'sē, England, a parliamentary borough in Middlesex and western suburb of London, on the north side of the Thames, chiefly distinguished for containing a royal military hospital. A building was originally commenced here by James I. as a theological college, but was never finished. In the reign of Charles II. the erection of the present hospital for sick, maimed, and superannuated soldiers was begun. It was carried on during the reign of King James II., and finished in that of William and Mary by Sir Christopher Wren, in 1692. The whole expense of this structure amounted to £150,000, and the extent of the grounds is now about 66 acres. The pensioners maintained here number about 550, and consist of soldiers maimed or disabled in the military service, or who have served for 21 years. All pensions are granted by the commissioners of Chelsea Hospital, but most of the recipients are known as out-pensioners. Their number amounts to about 80,000. It is from them that the in-pensioners are selected. Not far from the hospital is a royal military asylum for the education and maintenance of the children of soldiers. George Eliot, Dante, Rossetti, and Carlyle were once residents of this borough. Carlyle is known as "the Sage of Chelsea." Pop. (1901) 93,841.

Chelsea, Mass., a city of Suffolk County, separated from East Boston by Chelsea Creek, and from Charlestown by the Mystic River. It is a suburb of Boston, and is connected with it by ferries, electric, and steam railroads; and the Mystic River is crossed here by a bridge 3,000 feet long. Chelsea has a United States Marine Hospital, United States naval powder magazine, Soldiers' Home, Fitz Public Library, and Odd Fellows' and Masonic halls. It has extensive manufactories of rubber goods, foundry and machine-shop products, leather, cordage, brass goods, pottery, iron and steel, etc. In 1900 there were 308 manufacturing establishments, with $8,211,682 capital and 3,332 hands and an annual output valued at $10,333,549. It has numerous churches, high and graded public schools, weekly newspapers, two national banks, and an assessed property valuation of over $23,000,000. Chelsea was settled at Winnisimmet in 1630; was a part of Boston until it was organized as a town in 1738, and was incorporated as a city in 1857. Pop. (1900) 34,072.

Chelsea Hospital. See CHELSEA.

Chelsea Village, now a part of New York. The name is still preserved in Chelsea Square between Ninth and Tenth Avenues and Twentieth and Seventy-first Streets. Clement C. Moore, the author of 'Twas the Night Before Christmas,' owned here a farm in the early part of the last century. He sold it off in lots, and the place was called Chelsea Village.

Cheltenham, chĕl'tĕn-ăm, England, a municipal and parliamentary borough, and popular watering-place, in the county of Gloucester, seven miles northeast of the city of Gloucester, on the river Chelt, a short tributary of the Severn, 120 miles from London by rail. It is a city of gardens, protected by hills, and surrounded with beautiful scenery. Cheltenham spas first occasioned the rapid growth of the town, but the baths and springs are less frequented than formerly. The springs were discovered in 1716 by accident, but became famous in 1788 through a visit paid to them by George III. The parish church is a fine old Gothic structure, and the Roman Catholic and Congregational churches are two of the finest in England. The town is an educational centre. There is a college for boys (founded in 1843), with an attendance of 700 scholars; and the ladies' college, with 500 pupils. There are also two training colleges for teachers. Among the other public institutions may be mentioned its libraries, assembly rooms, the college museum, pump-rooms, theatre, and numerous places of fashionable resort. There are hospitals, orphanages, etc. Cheltenham returns one member to Parliament. The town has a large brewery and ironworks. Pop. parliamentary borough (1901) 52,858; municipal borough 49,439.

Chelyuskin, chĕl-yoos'kĭn, Cape (formerly Northeast Cape, and sometimes called Cape Severo), the extreme northern point of Asia, on a peninsula of the same name, which forms the western arm of the eastern half of the Taimyr Peninsula. It is named after a Russian officer who led an expedition thus far in 1742, and here succumbed, with his wife, to the fatigues of the journey; it was not revisited till 1878, when Nordenskjöld, in the Vega, spent 19 and 20 August here. Lat of the west is 77° 36′ 37″ N., that of the east 77° 41′ N.

Chemical Affinity, the force which causes two or more dissimilar substances to combine in definite proportions to form a new substance, whose properties are distinct from those of any of the constituents. The word "affinity" was originally employed in this sense because it was believed that a kind of relationship exists between substances that are capable of combining with one another. No such idea as this is entertained in modern times, and it might even be said that the tendency toward combination is (in general) stronger, in proportion to the dissimilarity, or lack of obvious relationship, between the substances combining. In the time of Aristotle the constituent particles of bodies were conceived to be endowed with qualities somewhat akin to love and hate. After the advent of Galileo, these notions were exchanged for equally erroneous but more mechanical ones, and the ultimate particles were represented, in thought, as provided with hooks and other similar devices, by means of which their com-

binations were conceived to be effected. Later, when the law of universal gravitation was propounded by Newton, the force impelling the atoms toward one another, and holding them in their combinations, was naturally enough pictured as a special form, or manifestation, of gravitative action. This latter view may possibly be true, but if so we must modify our present views with regard to gravitation somewhat, and assume that it follows different laws, when acting at molecular distances, from what it does when acting at distances that are appreciable to the senses. The modern tendency appears to be rather in favor of viewing chemical affinity as an electrical manifestation, though no really defensible, intelligible, and definite form has yet been given to this notion.

It was formerly thought possible to arrange the elements in the order of their chemical affinity, so that each element in the array would expel all those that preceded it from their combinations, and tables of this sort were published nearly two centuries ago (in 1718) by Geoffroy. Later, it was found that no such definite law exists; and Claude Louis Berthollet, in his famous 'Essai de Statique Chimique' (Paris, 1803), pointed out that the combination of substances depends not only upon the affinity that such substances have for each other, but also upon the relative quantities in which they are present. For example, if barium sulphate and potassium carbonate are melted together, the former is always partially converted into carbonate; but in order to effect its total conversion into carbonate, it is necessary that the quantity of carbonate of potassium present shall be at least six or seven times as great as the equation $BaSO_4 + K_2CO_3 = BaCO_3 + K_2SO_4$ would appear to require. In recent times the necessity of taking account of the relative masses of the combining substances has been fully recognized, and a good idea of the important results that have followed may be had from Nernst's 'Theoretical Chemistry from the Standpoint of Avogadro's Rule and Thermodynamics' (translated into English by Prof. C. S. Palmer). Numerical estimates of the "affinity"of various substances have been obtained by many methods, but the results are not always in as good accord with one another as could be wished, and a discussion of the differences would require a volume. For a brief but excellent review of the different methods consult W. C. D. Whetham, 'Solution and Electrolysis.' See DISSOCIATION; EQUILIBRIUM (*Chemical*), and SOLUTION.

Chemical Analysis is the art of determining the constituents of which a given substance is composed. The analysis is "qualitative" if it is made solely for the purpose of discovering what those constituents are. It is "quantitative" if the object is to ascertain the quantity of each that is present. It is hardly necessary to say that in the examination of an unknown substance a qualitative analysis must be made before a quantitative examination is attempted. because the methods that must be employed in quantitative work depend altogether upon the nature of the constituents that are to be determined. An analysis is said to be "ultimate" when its object is merely to discover what elements are present, and in what quantity each occurs. It is said to be "proximate" when it is made for the purpose of learning how these elements are combined with each other, and what radicals or other proximate constituents are present. General methods are known, which suffice for the ultimate analysis of any compound that may be proposed; but chemical science has not yet been developed sufficiently to formulate equally general methods for proximate analyses. Methods are indeed known for the recognition of certain of the organic radicals, but most of the problems that arise in proximate analyses are of such a nature that special means must be devised to fit each special case.

QUALITATIVE ANALYSIS OF INORGANIC SUBSTANCES.

In the qualitative analysis of inorganic substances, the color that the proposed compound communicates to the flame of a Bunsen burner often affords useful information as to the nature of the compound, and a systematic examination of the substance in the flame of the blowpipe may afford much additional information. (See BLOWPIPE ANALYSIS.) When the substance is partially volatilized in the flame of the Bunsen burner, or by the electric spark from an induction coil, and the light of the flame (or the spark) is examined through the spectroscope, many of the elements can be recognized, even when present in exceedingly small quantities, by the occurrence, in the spectrum, of certain characteristic bright lines, or groups of such lines. (See SPECTROSCOPE.) The usual method employed, however, for the detection of the commoner bases and acids, is known as the "wet process," and consists in bringing the substance into solution, and noting the behavior of this solution when certain reagents are added to it. Even in the analysis of inorganic substances (which are alone considered in the present section) troublesome combinations sometimes occur, and in such cases the reaction that might naturally be expected at a certain stage in the examination may be modified to a considerable extent, or even be suppressed altogether. An adequate account of conditions of this sort cannot be given in the present article, and they are not stated with any degree of completeness in the more elementary manuals on inorganic analysis. Good accounts of the various difficulties of this sort will be found, however, in Douglas and Prescott's 'Qualitative Chemical Analysis,' to which the reader is referred. The existence of difficulties and limitations being recognized, a general scheme for the detection of the commoner metallic elements may be given, which will be found to work satisfactorily in the majority of cases.

The first step in making an analysis in the wet way is to ensure the absence of organic matter, which might seriously interfere with the subsequent reactions. If organic matter be present, it may usually be detected by heating a part of the compound in a closed tube. If it blackens, or gives off a characteristic empyreumatic odor, organic matter is probably present, and it must be destroyed either by the continued application of heat, or (if there appears to be danger of losing any essential part of the inorganic substance by volatilization) by warming it with strong sulphuric acid. The organic matter being destroyed by either of these methods, the next step is to bring the substance into a state of solution. Water, either cold or hot, should first be tried as a solvent. If this does

not suffice, hydrochloric acid or nitric acid may be tried. If these reagents fail to dissolve it, one part (by weight) of the substance may be mixed with five parts of sodium carbonate and five of potassium carbonate, and the whole heated in a porcelain crucible until quiet fusion is attained. (This may take 30 minutes.) The crucible and its contents are then allowed to cool, and are immersed in dilute hydrochloric acid, or (if silver is suspected to be present) in dilute nitric acid. In this way most of the commoner insoluble substances may be brought into a state of solution. For methods that are applicable to substances that resist this mode of treatment, the more advanced treatises on analysis must be consulted. In case a part of the substance to be analyzed dissolves in water or in one of the other solvents, a separate examination of the solution so obtained should be made, the insoluble part being reserved for subsequent treatment, by the method indicated above.

The metals that will be considered in the present article may be divided into seven general groups, according to their behavior when treated with certain reagents that are known as "group reagents." These classes or groups are as follows:

1. Metals forming chlorids that are insoluble in water, and which are precipitated as chlorids upon adding hydrochloric acid to their solutions. (Silver, lead, and mercurous mercury.)

2. Metals that are precipitated from their acid solutions, by sulphuretted hydrogen, in the form of sulphids that are insoluble in ammonium sulphid, $(NH_4)_2S$. (Mercury, lead, bismuth, cadmium, copper, and silver.)

3. Metals that are precipitated from their acid solutions, by sulphuretted hydrogen, in the form of sulphids that are soluble in ammonium sulphid. (Arsenic, antimony, and tin.)

4. Metals whose sulphids are insoluble in water, and which are precipitated from neutral solutions, by ammonium sulphid, either as sulphids or as hydrates. (Iron, manganese, cobalt, nickel, and zinc are precipitated as sulphids; aluminum and chromium as hydrates.)

5. Metals which, upon addition of ammonium carbonate, are thrown down in the form of carbonates that are insoluble in ammonium chlorid. (Barium, strontium, and calcium.)

6. Metals which, upon addition of ammonium carbonate, are thrown down in the form of carbonates that are soluble in ammonium chlorid. (This group contains the single metal magnesium.)

7. Metals which remain in solution when treated by any or all of the foregoing reagents, and all of whose important compounds are soluble. (Potassium, sodium, lithium, and ammonium.)

It will be observed that none but the commoner metals are included in the foregoing list. For the relations of the rarer ones, and for their detection, reference may be had to the manual of Douglas and Prescott, referred to above.

The separation of the groups that are defined above may be effected as follows: Hydrochloric acid is added to the solution under examination, drop by drop, until no further precipitation takes place. The white precipitate consists of the chlorids of the metals of Group 1, and is to be preserved for further examination. The solution is filtered, and a drop or two of hydrochloric acid is added to the clear filtrate, to make sure that this reagent is incapable of inducing further precipitation. Sulphuretted hydrogen gas is then passed through the filtrate until the liquid smells strongly of the gas. If a precipitate is formed, it will consist of the sulphids of the metals of the second and third groups. Silver, however, will not (in general) be present, because it is ordinarily completely precipitated in the first group, and has therefore been already removed by filtration. Lead may not be completely precipitated in the first group, and hence its sulphid may occur in the present precipitate. The mercury in the present precipitate represents mercuric mercury in the original solution. The mixed sulphids of Groups 2 and 3 are removed by filtration, and are washed until the wash water is no longer acid. They are then boiled with ammonium sulphid. This reagent leaves the sulphids of Group 2 undissolved, but dissolves those of Group 3. Filtration then leaves the sulphids of Group 2 on the filter paper; and when the filtrate is acidified by the addition of hydrochloric acid, the sulphids of Group 3 are thrown down again.

The clear filtrate from which Groups 2 and 3 were removed by sulphuretted hydrogen gas is next made slightly alkaline by the addition of ammonia, and heated almost to boiling. Ammonium sulphid is then added, and the whole is kept warm for some time. The sulphids (or hydrates) of Group 4 are thus precipitated, and may be isolated by filtration. The filtrate from this operation is next boiled to expel all the sulphuretted hydrogen, and ammonia and ammonium chlorid are added. The solution is then heated to the boiling point, and treated with a solution of ammonium carbonate, $(NH_4)_2CO_3$. This causes the precipitation of the carbonates of Group 5, which are removed by filtration. The filtrate is boiled, and then treated with a solution of sodium phosphate, Na_2HPO_4, to which one sixth of its volume of ammonia has been added. Magnesium, the metal of the sixth group, is thrown down (if present) in the form of a white crystalline precipitate having the formula $Mg_2(NH_4)_2P_2O_8$. This is again removed by filtration, and the filtrate will contain, in solution, the metals of Group 7.

The several groups being thus separated, it remains to examine each group by itself, to see how its components may be isolated or otherwise recognized.

Group 1. The chlorids of this group, as obtained in pursuing the general scheme outlined above, may be separated very readily. Thus if the precipitate of mixed chlorids be treated with boiling water, the chlorids of silver and mercury will be unaffected; but the chlorid of lead will dissolve, and may therefore be isolated by filtration. The mixed chlorids of silver and mercury may be separated by treatment with hot ammonia. This reagent dissolves silver chlorid, which is again precipitated in the form of chlorid upon neutralizing its solution with nitric acid. The hot ammonia does not dissolve mercurous chlorid, but transforms it into a black substance that contains mercury, chlorine, nitrogen, and hydrogen, and remains behind upon the filter paper.

Group 2. All the silver present being assumed to be removed in the first group, the mixed sulphids of Group 2 are washed until the wash water ceases to redden blue litmus paper, and are then boiled with a small quantity of nitric acid. Lead, bismuth, cadmium, and copper pass into solution in the form of nitrates, while mercury sulphid remains unchanged, and may be isolated by filtration. The filtrate, containing the mixed nitrates, is evaporated to a small volume, and sulphuric acid is added. This precipitates lead sulphate, which appears as a whitish precipitate, removable by filtration. The filtrate from this last operation may contain the nitrates of bismuth, cadmium, and copper. If it is made alkaline by the addition of ammonia water, any bismuth that it contains will be thrown down in the form of the hydrate. The cadmium and copper nitrates are simultaneously reduced to the form of hydrates, which, however, remain in solution. Upon passing sulphuretted hydrogen through the solution containing them, a precipitate consisting of cadmium sulphid and copper sulphid is thrown down. If this is boiled with dilute sulphuric acid the copper sulphid remains unaffected, while the cadmium sulphid passes into solution. From the solution, sulphid of cadmium may be again thrown down by adding ammonia till the reaction is alkaline, and then passing sulphuretted hydrogen through the solution. If cadmium is present, its sulphid is thrown down as a bright yellow precipitate.

Group 3. When the sulphids of Group 3 have been isolated, some information may be had at once from the color of the precipitate. Thus arsenic sulphid is yellow, antimony sulphid is red, and tin sulphid is black. If only one of these elements is present, it may therefore be detected by the color of its sulphid. If more than one are present, the mixed sulphids are treated with a solution of ammonium carbonate $(NH_4)_2CO_3$. The sulphids of antimony and tin are unaffected, but the sulphid of arsenic passes into solution, and after filtration it may be again thrown down by the addition of hydrochloric acid. The mixed sulphids of antimony and tin are transferred to a porcelain dish, and heated with a small quantity of hydrochloric acid, to which a few crystals of chlorate of potash have been added. By this treatment they are reduced to the form of chlorids. The solution containing the mixed chlorids of antimony and tin should then be somewhat diluted, and a piece of platinum foil wrapped in zinc should be added. By the electrolytic action so set up, antimony and tin are thrown down, in the metallic state, upon the platinum foil; and the foil will be blackened in spots, if antimony be present. In any case the foil should be washed and boiled with hydrochloric acid diluted with its own bulk of water. In this way any tin that may be present is brought into the form of the chlorid, which dissolves; the antimony remaining unaffected. The presence of tin chlorid in solution may be readily demonstrated by the addition of a solution of corrosive sublimate. The tin is thereby reduced to the form of a higher chlorid, and a precipitate of Hg_2Cl_2 (calomel) is thrown down. If no tin is present, this precipitate is not formed.

Group 4. The metals of Group 4 are obtained, in the general scheme of separation outlined above, in the form of sulphids and hydrates. The precipitate containing them is to be treated in a porcelain dish with cold dilute nitro-hydrochloric acid. The sulphids of nickel and cobalt remain unaffected, and may be removed by filtration, since the other metals pass into solution. The precipitate that is undissolved should be tested in a borax bead before the blowpipe. (See BLOWPIPE ANALYSIS.) Cobalt gives a blue bead, while nickel gives a reddish-brown one. If both metals are present, the color is intermediate between these two. In the reducing flame the reddish-brown color due to nickel changes to a gray, while the blue of the cobalt remains unaltered; hence the reducing flame should be tried, if no decided indication of cobalt is obtained in the oxidizing flame. For other and more exact tests for distinguishing cobalt from nickel, special treatises on qualitative analysis should be consulted; see, for example, the treatise of Douglas and Prescott, and also Eliot and Storer, 'A Compendious Manual of Qualitative Chemical Analysis.' Nickel and cobalt being removed from the metals of Group 4 by the means indicated above, the filtrate containing the remaining members of the group is boiled until all the sulphuretted hydrogen is expelled. A little nitric acid is then added, and the solution is again boiled until the greater part of the acid is driven off, when the remaining solution is diluted with water. The small amount of free acid that is still present is neutralized with sodium carbonate, care being taken that no permanent precipitate is formed. The solution is allowed to cool, barium carbonate is added in the cold, and the whole is allowed to stand for fifteen minutes. The precipitate contains the aluminum, chromium, and iron in the form of hydrates, and also the excess of barium carbonate. The filtrate contains manganese and zinc. The precipitate is removed by filtration, dissolved in dilute hydrochloric acid, gently warmed, and made alkaline by ammonia. By this process the hydrates of aluminum, chromium, and iron are thrown down, free from barium. This precipitate of the hydrates is collected on a filter, dried, transferred to a porcelain dish, and dissolved in concentrated nitric acid. A few crystals of potassium chlorate are then added, and the solution is boiled for several minutes. Upon adding sodium hydrate in excess, the iron is thrown down in the form of hydrate, the aluminum and chromium remaining in solution. The iron being removed by filtration, the filtrate is divided into two portions. One of these portions is made acid with nitric acid, and ammonia is added in excess. Aluminum hydrate is thrown down, if aluminum is present. The other portion of the filtrate is made acid with acetic acid, and lead acetate is added. If chromium is present, a yellow precipitate of chromate of lead, $PbCrO_4$, is thrown down. The filtrate from the treatment with barium carbonate, which may contain zinc and magnesium, is heated to boiling, and the barium that it contains is completely precipitated with dilute sulphuric acid. The precipitate of barium sulphate is removed by filtration, and the filtrate is boiled, after addition of sodium hydrate in excess. If manganese is present, it is precipitated in the form of the hydrate, and may be removed by filtration. The filtrate from this operation is

acidified with acetic acid, and treated with sulphuretted hydrogen gas. If zinc is present, it is thrown down in the form of a white precipitate of zinc sulphid, ZnS.

Group 5. The metals of this group (barium, strontium, and calcium) are isolated, in the general scheme, in the form of carbonates. To separate them from one another, the mixed carbonates are dissolved in dilute acetic acid, and a portion of the solution is tested for barium by the addition of potassium chromate, K_2CrO_4 (not the bichromate, $K_2Cr_2O_8$). If barium is present, a straw-yellow precipitate of barium chromate, $BaCrO_4$, is thrown down. If barium is not present, we may proceed at once to the tests for calcium and strontium; but if it is present, it must first be removed from the solution by cautiously adding potassium chromate until no further precipitate is formed, and then filtering. In this case it is necessary to remove the excess of chromate of potassium before testing for calcium and strontium, because these two metals cannot be separated in the presence of that reagent. For this purpose the filtrate containing the strontium and calcium (which must be perfectly free from barium chromate, even though several successive filtrations may be necessary in order to make it so,) is made alkaline by ammonia, and ammonium carbonate is then added until the carbonates of strontium and calcium are all precipitated, the potassium chromate remaining in solution. After filtration and thorough washing, the mixed carbonates of strontium and calcium are dissolved in hot acetic acid, and the solution is boiled. Dilute sulphuric acid is then added; and if the acid is sufficiently dilute, a white precipitate of sulphate of strontium is thrown down, while the sulphate of calcium (which is formed at the same time) remains in solution. After standing for fifteen minutes or more, in order that the precipitation of strontium sulphate may be complete, the solution is filtered, and the clear filtrate is tested for calcium by first adding ammonia until an alkaline reaction is obtained, and then adding a solution of oxalate of ammonia. If calcium is present, a white precipitate of calcium oxalate is obtained.

Group 6. This "group" contains magnesium only. Hence the presence of magnesium will be made apparent at once in the course of the preliminary separation into groups.

Group 7. Potassium, sodium, lithium, and ammonium belong to this class. These metals are characterized by the high solubility of all their important salts. Ammonia, being used in the separation of the groups as a reagent, is sure to be present in the final solution that has been designated as containing the metals of "Group 7." Hence if it is desired to test for that substance, the test should be made upon a specimen of the original solution, before any ammoniacal reagent has been added. The test is very simple, and consists merely in heating some of the proposed solution with milk of lime (calcium hydrate in suspension). All salts of ammonia are decomposed in this way, with the liberation of ammonia gas, which may be recognized by its smell or by its turning moist red litmus paper blue. The general nature of the reaction involved in the liberation of ammonia gas may be illustrated by the case of ammonium sulphate. We have $(NH_4)_2SO_4 + Ca(OH)_2 = CaSO_4 + 2NH_3 + 2H_2O$. Sodium, potassium, and lithium may be sought for in the final filtrate obtained in the separation of the fundamental groups, since no compounds of those metals have been used as "group reagents." They are best identified by means of the colors that they communicate to the flame of a Bunsen burner. For performing a test of this sort, the filtrate containing these metals should be evaporated to dryness in a porcelain dish, and the residue ignited until any ammoniacal salts present are eliminated by volatilization. The dish is then allowed to cool, and its contents are moistened with a few drops of distilled water. A piece of platinum wire is next thoroughly cleaned, moistened with hydrochloric acid, and held in the Bunsen flame until it ceases to communicate any color. The wire is then dipped into the solution in the dish, and again held in the flame. Potassium salts give a fine blue color, lithium salts a red, and sodium salts an orange yellow. Unless sodium is present in very small amount, its strong, brilliant flame-color is almost certain to obscure the colors due to any other elements present. Chemists therefore make use of colored glasses that are practically opaque to sodium light, using them as screens through which to view the Bunsen flame. The commonest glass of this kind is the "cobalt-blue" glass, which is used for the detection of potassium, since it is quite transparent to the flame-color of that metal.

For methods of examination adapted to the detection of gold, platinum, and other of the less common metals, reference must be made to books on chemical analysis.

The metals that exist in a proposed substance being known, it remains to discover in what chemical combinations they are present. It is usually impossible to learn, by mere qualitative analysis, which of the acid radicals that may be present is combined with any given one of the metals; but it is possible to ascertain that certain kinds of compounds (such as sulphates, chlorids, and the like), are present, and a chemist of experience, who is familiar with the kind of work in hand, can often infer, with considerable probability, how the bases and acids are associated with one another. In the present article it is not possible to discuss this difficult phase of analysis, but a few of the more common tests for the presence of acid radicals may be given.

There is no general scheme for the detection of these radicals, by which they are separated into groups like the metals, and eventually isolated singly. In examining a substance for them, all that can be done is to apply certain tests, largely independent of one another, and best carried out by dividing the original solution into a number of parts, each of which is to be examined for a single class of acid radicals, and then thrown away.

When a solution of barium chlorid is added to a neutral or slightly alkaline solution, a precipitate of the corresponding barium compounds is thrown down if the solution tested contains sulphates, phosphates, borates, oxalates, fluorides, carbonates, silicates, tartrates, sulphites, hyposulphites, arseniates, arsenites, or chromates. (If the original solution contains lead, silver, or mercury, nitrate of barium is used as a reagent in the place of the chlorid, because otherwise a precipitate of the chlorids of those metals would also be obtained.) The mixed pre-

cipitate just obtained is isolated by filtration, washed, and treated with dilute hydrochloric acid. All of the compounds named pass into solution, with the single exception of the sulphate; and if a white, insoluble precipitate remains after treatment with dilute hydrochloric acid, the presence of sulphates in the original solution is demonstrated. The hydrochloric acid solution is next made alkaline by ammonia, when a precipitate will again be thrown down, if the original solution contained oxalates or phosphates. Certain other salts also may be thrown down at this point; and, therefore, if any precipitate is obtained, confirmatory tests for oxalic and phosphoric acids should be applied to the original solution before the presence of those substances can be regarded as really proved.

If the original solution contains a carbonate, it will effervesce upon the addition of hydrochloric acid, owing to the liberation of carbon dioxid. If it contains a sulphite, the addition of hydrochloric acid will liberate sulphur dioxid, which is readily recognized by smell. If it contains a hyposulphite, sulphur dioxid will also be liberated, but the solution will at the same time become turbid from the liberation of free sulphur. If it contains an alkaline silicate (other silicates are not soluble in water) in considerable quantity, the addition of hydrochloric acid will cause the silicic acid to separate in the form of a gelatinous precipitate, which, when dried and ignited, is gritty. The presence of the arsenic acids may be established by Marsh's test for arsenic. (See ARSENIC.) If a tartrate is present, the original compound, when obtained in the solid state by evaporation or otherwise, is blackened by heat, with a characteristic odor suggestive of burnt sugar. The presence of a fluoride in the original substance is established by the liberation of hydrofluoric acid (see FLUORIN) when that substance is heated gently with concentrated sulphuric acid. The presence of a chromate is indicated by the precipitate from the addition of barium chlorid exhibiting a yellow color. As a confirmatory test, a solution of lead acetate may be added to a neutralized sample of the liquid under examination. If a chromate is present, a yellow precipitate of chromate of lead is thrown down, which is soluble in caustic soda, but insoluble in acetic acid. To test for the presence of borates, a sample of the original liquid is acidified with hydrochloric acid, and a piece of turmeric paper is wetted with it, thoroughly dried before a flame, and finally moistened with a solution of sodium carbonate. If a borate is present, the color of the paper, where wetted with the sodium carbonate, changes to a greenish black.

To test for chlorids and certain other salts, a fresh specimen of the original solution should be chosen, and if it is not already acid, it should be made so with nitric acid. A solution of nitrate of silver is then added, whereupon a precipitate will be thrown down if chlorids, bromides, iodides, cyanides, or sulphids are present. (Cyanid of mercury, however, gives no precipitate at this point.) The precipitate should be removed by filtration, thoroughly washed, and then treated with hot ammonia. The chlorid, bromide, and cyanide of silver dissolve, while the sulphid and iodide remain behind, unchanged. The sulphid is black, while the iodide is yellowish. For methods of distinguishing between the chlorid, bromide, and cyanide precipitates, reference must be made to the works on chemical analysis. It may be said, however, that the cyanide, when heated is reduced to metallic silver, with the liberation of cyanogen gas. The presence of an iodide, when this is made doubtful by the black precipitate due to a sulphid, may be further investigated by the iodide of starch test. (See IODINE.)

Nearly all of the nitrates and acetates are soluble, and hence precipitation tests are not commonly used for the detection of nitric and acetic acids. Color tests are usually employed instead. To test for acetic acid, the original solution may be made neutral, and a few drops of ferric chlorid added. If acetates are present, the solution takes on a dark red color, owing to the formation of ferric acetate. To test for nitrates, a portion of the original solution is mixed with a solution of ferrous sulphate in a test tube, and strong sulphuric acid is poured down the side of the inclined tube, in such a manner as not to mix with the contents, but to form a layer at the bottom of the tube. If nitrates are present, a purplish or reddish ring, changing to a dark brown, will be observed at the surface of separation of the two liquids.

QUANTITATIVE ANALYSIS OF INORGANIC SUBSTANCES.

Quantitative analysis is far more difficult than mere qualitative analysis, and cannot be treated adequately in a popular encyclopædia. As has been said, unless the nature of the substance is known in some other manner, a preliminary qualitative analysis must be made. Several usual methods of making quantitative analyses will be described below.

Electrolytic Method.— When the substance to be analyzed is an alloy, or a simple mixture of metallic salts, its metallic components may often be readily separated by the electrolysis of its solution, the separation of the metals being based upon the known fact that in electrolysis the nature of the deposit depends largely upon the nature and degree of concentration of the solution, the sizes of the electrodes, and the strength of the electric current that is employed. By systematic study of the effect of these conditions in the electrolysis of mixtures of metallic salts, it is found to be possible to deposit one metal upon the cathode, while the others remain in solution. The electrolytic method has been developed to a considerable extent, and promises to be of great value. Thus far, however, it is not in extensive general use. For details concerning it, consult Classen, 'Quantitative Analysis by Electrolysis,' and the various papers that have been published by Prof. Edgar F. Smith, for some years past, in the Journal of the Franklin Institute. See also the article ELECTROLYSIS in this encyclopædia.

Gravimetric Methods.— Strictly, any method of analysis in which the quantity of each constituent is determined by weighing is a gravimetric method; but the term is usually understood to exclude the electrolytic method just mentioned. In gravimetric work the components that are to be weighed may be separated by fire-methods, or by selective precipitation from solutions, as in the scheme of qualitative analysis outlined above. The fire-methods are commonly used in the estimation of gold and silver,

and are described in the article ASSAYING. The wet methods do not differ in general theory from the method given above for qualitative analysis; for it is evident that any precipitate which contains only one base may be isolated and weighed, and that the quantity of the base present may be calculated from the observed weight of the precipitate, and its known chemical formula. But the practical case is by no means as simple as this statement would indicate; for certain matters of detail, that are not of the slightest importance in qualitative work, must be attended to with great care in quantitative analysis. For example, the substance that is to be determined must be isolated by a method that will ensure its perfect separation from every other substance that may be present; the precipitate that is to be weighed must be granular enough to be filtered easily and without loss; the precipitate must not be liable to oxidation nor other change upon exposure to air for such time as its manipulation may demand; it must be of such nature that it can be thoroughly dried; and it must not be hygroscopic enough to absorb sensible quantities of water from the air, from the time it is dried until the weighing has been completed. Thus in qualitative analysis aluminum may be recognized by the precipitation of the hydrate; but in quantitative analysis it is necessary to reduce the metal to the form of the oxid. The hydrate is usually gelatinous when freshly precipitated, and it retains traces of the acid with which the metal was previously combined, and also traces of the alkali that was used in the precipitation of the hydrate. These facts are of no consequence in qualitative work, but their importance in quantitative investigation is evident.

Volumetric Methods.— In volumetric analysis the quantities that are to be measured are determined by the measurement of volumes, and weighings are resorted to only in the preparation of the standard reagents that are to be used. The reagents are made up in certain standard strengths, according to the purposes for which they are wanted; but the usual strengths are those designated as "normal" and "decinormal" solutions. A "normal" solution is one having such a strength that one litre of the solution contains as many grams of the reagent as there are units in the reagent's chemical equivalent. Thus the chemical equivalent of sodium hydrate, NaOH, is (in round numbers) $23 + 16 + 1 = 40$; and hence a "normal" solution of sodium hydrate is one which contains 40 grams of that substance to the litre. A "decinormal" solution of this reagent contains 4 grams of it per litre, and a "centinormal" solution contains 0.4 gram per litre. If the reagent is a bivalent acid, or a salt of a bivalent base, the number of grams of it present in each litre of solution must be equal to half the molecular weight. Thus sulphuric acid, H_2SO_4, contains two atoms of replaceable hydrogen, and its molecular weight is $2 + 32 + 64 = 98$. Hence a normal solution of sulphuric acid contains 49 grams of the anhydrous acid, per litre of solution. The general idea is to have all of the reagents of such a strength that if one cubic centimeter of any "normal" acid solution be added to one cubic centimeter of any "normal" alkaline solution, the mixture will be precisely neutral. As an illustration of the method that is followed, let it be assumed that a manufacturer buys a carboy of oil of vitriol, and wishes to know what proportion of pure sulphuric acid it contains. If the acid were quite free from water, 49 grams of it would be exactly neutralized by 1,000 cubic centimeters (that is, one litre) of any normal alkali solution. It is more convenient to work with one tenth of this quantity of acid and reagent; so that the experiment will consist in weighing out 4.9 grams of the oil of vitriol, diluting it with water, adding a piece of litmus paper, and letting a normal alkali solution pass into it (preferably from a graduated burette) until the acid is precisely neutralized. If 100 cubic centimetres of the alkali were required to effect the neutralization, the given sample of oil of vitriol would be known to contain 100 per cent of its weight of sulphuric acid,— or to be entirely free from water. On the other hand, if only 53.9 cubic centimetres of the normal alkali solution were required to effect neutralization, the sample would be known to contain 53.9 per cent of its own weight of sulphuric acid. As a further example, suppose it is desired to ascertain the percentage of sodium oxid present in a given sample of crude soda ash, without raising the question as to whether the sodium actually occurs as oxid, hydrate, or carbonate. The formula of sodium oxid is Na_2O, and its molecular weight is $46 + 16 = 62$. As it contains two atoms of sodium to the molecule, we weigh out 3.1 grams (not 6.2 grams) of it, dissolve in water, and dilute and add litmus paper as before. Then into the solution we pass a normal acid solution until neutralization is effected. If 46.7 cubic centimetres of the normal acid solution are required, the alkali present in the sample, when computed as sodium oxid, constitutes 46.7 per cent of the weight of the whole. This process is called "acidimetry" when it is used for estimating the strengths of acids, and "alkalimetry" when it is used in estimating the strengths of alkalis. As a further illustration of volumetric methods the estimation of chlorine (known as "chlorimetry") may be considered. If the substance to be examined for chlorine is bleaching powder, 10 grams of the powder are dissolved by rubbing with water in a mortar, and the solution is diluted till it occupies a litre. It is then well shaken, and 100 cubic centimetres are drawn off into a beaker, by means of a pipette, and treated with a decinormal solution of arsenious acid (As_2O_3) until a drop of the mixture, when withdrawn by a glass rod, gives no blue stain upon filter paper that has been soaked in starch liquor and iodide of potassium. The number of cubic centimetres of decinormal arsenious acid solution required is to be multiplied by the constant multiplier 0.00355, and the product is the weight of available chlorine, in grams, contained in each gram of the original powder. (For explanation of the multiplier 0.00355, and for full details of this process and of volumetric analysis generally, consult Francis Sutton, 'Systematic Handbook of Volumetric Analysis.')

The analysis of gases is of so special a character that it is treated under a separate heading. See GASOMETRIC ANALYSIS.

ORGANIC ANALYSIS.

In the analysis of organic compounds, no general scheme can be given, corresponding to

that which is used in the systematic examination of inorganic substances. The number of possible organic compounds is so great, that practically nothing can be done in the way of effecting a "proximate" analysis of a compound concerning whose general nature we have no preliminary information. For the more or less general methods that have been developed for the examination of special classes of organic substances, advanced books on organic analysis must be consulted. The ultimate analysis of an organic substance consisting of oxygen, hydrogen, and carbon, may be effected by burning the substance in a glass tube in a current of oxygen gas. The carbon is converted into carbon dioxid, which is absorbed by potash and estimated quantitatively by observing the gain in weight of the potash; and the hydrogen is converted into water, which is similarly estimated by absorption by calcium chlorid. The oxygen of the original compound is then estimated by difference. When nitrogen is also present, the process is somewhat more complicated. In this case the gases of combustion may be pased over red-hot metallic copper to absorb the oxygen, and the nitrogen may be measured in the free state, the oxygen being finally concluded by difference, as before.

Consult (in addition to the works mentioned above), Fresenius, 'Manual of Qualitative Chemical Analysis' and 'System of Instruction in Quantitative Chemical Analysis'; Thorpe, 'Quantitative Chemical Analysis'; Prescott, 'Outlines of Proximate Organic Analysis.'

A. D. RISTEEN,
Editorial Staff 'Encyclopedia Americana.'

Chemical Industry, The. Labor is a combined effort of the animal kingdom, led by mankind, to overcome and subdue, to subject and utilize, the forces of nature. Labor, in its various relations, assumes forms that are both psychical and physical in character. Groups, combinations, and subdivisions of these forms exist in the great war of the animal kingdom on the solid, fluid, and gaseous conditions of matter. Hence it is that the chemist and chemical manufacturer are called on to organize and array the final attack on all known productions of the earth, of the water, and of the atmosphere.

The chemical industry of the United States may be considered to have been in existence, at this time, about 100 years. In common with other leading manufactures, it has reached large proportions. Almost every State of the Union has chemical establishments of some kind. The industry is affected for good or bad in quick response to the rise and fall of other manufactures.

Before the Revolution no chemicals were made here. From such reports as are obtainable it appears that 8,000 pounds of copperas were made in Vermont in 1810, and a smaller quantity in Maryland in the same year. In 1813 alum was made in the latter State. Oil of vitriol was manufactured in Philadelphia in 1793. At Baltimore, the manufacture of chemicals, paints, and medicine began in 1816. In the census of 1820, two chemical establishments were reported from New York.

By 1830 the industry was firmly established in the United States, Philadelphia being the centre. There were then 30 firms in the business in the entire country, having a capital of $1,158,000, and producing articles valued at $1,000,000 per annum. Alum, copperas, and some other articles were manufactured to the almost entire exclusion of the foreign product. The list of productions included calomel and various other mercurial preparations, Glauber's and Rochelle salts, tartar emetic, ammonia, sulphate of quinine, oil of vitriol, tartaric, nitric, muriatic, oxalic, and acetic acids, aqua fortis, Prussian blue, chrome yellow, chrome green, refined saltpetre, refined borax, refined camphor, acetate and nitrate of lead, prussiate of potash, and bichromate of potash.

COMPARISON OF THE QUANTITIES AND VALUES OF THE PRINCIPAL PRODUCTS REPORTED: 1890 AND 1900

Products	1890		1900	
	Quantity	Value	Quantity	Value
Total	.....	$163,547,685	.....	$221,217,217
Alum, pounds	93,998,008	1,616,710	179,467,471	2,446,576
Coal-tar products	.....	687,591	.....	1,421,720
Dyeing and tanning extracts and sumac, pounds	187,906,911	8,857,084	169,525,536	7,767,226
Gunpowder and other explosives, pounds	125,645,912	10,993,131	215,590,719	16,950,976
Fertilizers, tons	1,898,806	35,519,841	3,091,717	45,911,382
Paints, colors, and varnishes	.....	52,908,252	.....	71,313,392
Potash and pearlash, pounds	5,106,939	197,507	3,864,766	178,180
Sodas, pounds	333,124,375	5,432,400	1,279,082,000	10,237,944
Sulphuric acid, 50°, pounds	1,009,863,407	4,307,067	1,906,878,903	7,965,832
Sulphuric acid, 60°, pounds	20,379,908	122,940	34,023,131	246,284
Sulphuric acid, 66°, pounds	354,533,657	3,249,466	754,558,455	6,035,069
Wood alcohol and acetate of lime	.....	1,885,469	.....	5,775,290
Chemicals (including all acids, bases, and salts not heretofore enumerated)	.....	24,751,974	.....	40,791,690
All other products	.....	13,018,253	.....	4,175,656

The totals for the chemical industry, as reported in last census, are shown in the following summary:

CHEMICAL INDUSTRY IN 1900

Number of establishments reporting	1,740
Capital:	
Direct investment	$238,529,641
Officers, firm members, and clerks:	
Total number	8,605
Total wages	$ 11,340,385
All other employees:	
Total number	61,553
Total wages	$ 21,799,251
Cost of materials used	124,043,837
Value of products	221,217,217

The principal products reported, and their quantity and value, are shown in the table above.

The most important of all chemical products

is sulphuric acid, which maintains its supremacy over any other known article in promoting the manufacturing interests of the world. The large increase in the quantity produced, together with the reduction in price, indicates the advance that has been made in general manufactures in the United States during the decade intervening.

From technical considerations, manufactured manures are the next in importance to sulphuric acid in the category of chemical productions. The total of 2,887,004 tons of these materials produced, indicates, by no inaccurate measure, the extent of the farming interests of the country. When we consider that about 300 pounds of artificial fertilizer are commonly used to one acre of land, it is seen that nearly 20,000,000 acres were enriched by its use. The increase in manufacture over 1890 is 1,023,398 tons. These figures show that large areas of our country are becoming unprofitable to farm without the use of these aids to fertilization; and the existence of factories in the States of California, Illinois, Indiana, Michigan, Minnesota, and Wisconsin is indicative of the gradual exhaustion of soil that was virgin in character less than 30 years ago. These facts tend to show that the time is approaching when none of our unmanured soils will yield in remunerative quantity. They prove that economies are coming into practice in the utilization of material that formerly ran to waste.

The farmer occupies a reversed position to that of the manufacturer of artificial manures. By prodigal wastefulness and culpable ignorance, he permits immense quantities of manurial matter to find their way to the sea, while bemoaning his lot and sighing over the yield of virgin lands in comparison with that of his own; whereas the manufacturer, by the aid of chemical skill and mechanical devices, converts refuse matter into valuable merchandise.

The figures presented here yield consolation to the farmers of the Atlantic slope. When the not distant time arrives for the extinguishment of an agriculture that is based on primordial soil, the lands of these regions will recover their lost value; for the facts herein submitted tend to show how closely fertility is allied to the production of manufactured manures, and this manufacture can be carried on most profitably at those points where supplies of foreign crude material can be obtained, and where seaboard transportation can be made available.

The States of the Union often provide chemical manufactures relatively to their natural products; but the markets for chemicals are situated chiefly at such attractive points as the great centres of textile manufacturing, of dyeing and bleaching works, and of the oil-refineries and artificial-manure works; hence chemical works are to be found principally at or near these points.

The leading articles of raw material and their derivatives used in chemical manufactures, briefly stated, are as follows:

RAW AND MANUFACTURED CHEMICALS

Raw Material	Manufactured Articles or Derivatives
Brimstone or sulphur; pyrites containing sulphur.	Oil of vitriol, or sulphuric acid, the most important of all chemicals.
Nitrate of soda.	Nitric acid and all nitrates.
Salt (common).	Soda; muriatic acid.
Potash salts.	Bichromate of potash, prussiate of potash, and many other combinations.
Nickel ores.	Salts of nickel, for plating.
Chromic-iron ores.	Chromates of potash and soda.
Antimony ores.	Alloys; medicinal salts.
Bismuth ores.	Alloys; medicinal salts.
Copper ores.	Sulphate of copper, or blue vitriol.
Cobalt ores.	Oxide of cobalt.
Iron ores.	Sulphate of iron, or copperas.
Lead ores.	White and red lead; litharge.
Manganese ores.	Disinfectants; chlorine.
Mercury ores.	Calomel; white and red precipitate; vermilion.
Zinc ores.	Oxide of zinc.
Gold.	Chloride of gold.
Silver.	Nitrate of silver.
Innumerable vegetable productions.	Dyeing extracts; alkaloids; acids; and pharmaceutical preparations.
Linseed.	Paints.
Cotton-seed.	Soap; oils used in cooking.
Cotton.	Guncotton.
Corn and all cereals.	Glucose; alcohol; starch.
Wood.	Explosives; oxalic acid; potash; acetic acid; paper.
Argol or tartar.	Tartaric acid; cream of tartar.
Borate of lime.	Borax.
Barytes.	Paints.
Chalk.	Whiting.
Iodine.	Sublimed iodine; all iodides.
Limestone.	Lime; carbonic acid.
Magnesia.	Carbonate and sulphate of magnesia.
Ochres.	Paints.
Crude phosphates.	Phosphorus.
Fats.	Soap; glycerine.
Animal matter, such as horns, hoofs, and leather.	Prussiate of potash; artificial manures.
Oils.	Soap; Perfumes.
Coal (bituminous).	Ammonia; coal-tar colors; cyanide of potash.
Clays.	Alum.
Corundum.	Aluminum.
Cryolite.	Alum; soda.
Silica or sand.	Silicate of soda; glass.
Tin.	Tin-salts, for dyeing purposes.
Atmospheric air.	Oxygen.
Water.	Gas; hydrogen; oxygen.

The innumerable variety of combinations made of the raw materials named renders it impossible to state them in any limited space. The variety of raw materials, and of the numberless combinations thereof, gives to the chemical industry a unique position. No other branch of manufacture can approach it in scope, in the necessity for its existence, or in the knowledge required for its prosecution.

The merchandising in chemicals is of a complex character, and is based chiefly on chemical tests, both of the raw materials and of the manufactured articles. The markets of all quarters of the globe are scanned, and supplies, in many instances, are carried in large quantities, owing to the remote points of their production. The chemical industry affords one of the largest sources of transportation to railroad and water carriers, in raw materials as well as in partly finished and wholly manufactured stuffs. In many articles the competition of countries enjoying low prices for labor is difficult to meet. On the other hand, through advantages not enjoyed by foreign manufacturers, considerable exportation of certain chemicals is going on at this time.

The industries or trades dependent upon the manufacture of chemicals may be enumerated as follows:

INDUSTRIES USING CHEMICAL PRODUCTS

Woolen manufacture.	Tanning.
Cotton manufacture.	Glass manufacture.
Silk manufacture.	Soap manufacture.
Oil-cloth manufacture.	Artificial ice manufacture.
Explosives manufacture.	Pharmaceutical manufact'r.
Pyroxylin manufacture.	Pyrotechnic manufacture.
Paint manufacture.	Electrical or galvanic manufacture.
Glucose manufacture.	
Artificial manures.	Printing-inks manufacture.
Oil refining.	Paper manufacture.
Bleaching-works.	

The plant of a chemical works involves the use of a larger area of land than is necessary in other manufactures as the buildings adaptable to the operations are usually only one story high, nearly all the work being done on the ground floor, where large furnaces, grinding-mills, and engines can be placed. This is one reason that the capital required for the conduct of these manufactures seems disproportionate to the value of the products, in comparison with other branches of industry. In the eyes of one unversed in the art, a chemical works may appear to be only a mass of rude furnaces, old pots, and rough machinery; yet the establishment may contain appliances of the most costly description, such as underground flues; furnaces of the most modern construction; iron castings fashioned in innumerable forms and weights; copper vessels, coils, and stills; thousands of fire-bricks and other forms of refractory material; steam boilers of the most economical pattern; lofty chimneys; powerful engines; expensive pumps; mills of different kinds for the grinding and powdering of a great variety of materials; leaden chambers for acid making, with tanks, towers, and accessories of the same metal; platinum apparatus and stills for concentrating sulphuric acid; and chemical earthenware, vitrified to resist the action of acids. Indeed, it may be stated that a chemical works of any magnitude contains and requires every manufacturing appliance used or known, excepting those adapted especially to weaving and printing.

Skill and scientific knowledge are needed in the successful conduct of manufacturing chemistry at this time to an extent unthought of by the men who were good workers 20 years ago. The competition of scientific Germany in many departments of chemical manufacture has forced the progress of an industry that was yet in its infancy two decades ago. The laboratory, well equipped with careful workers and good apparatus, has become the pulse of the whole establishment. Each step in the processes is indicated in the unerring results obtained by the analyst and tester, while the huge and costly machinery of the factory is the counterpart, to a great extent, of the miniature equipment of the laboratory. Chemical engineering is an important factor in the adjustment of plant to the exigencies of the difficult and tortuous operations. Some institutions of learning have recognized this fact by adding to their curriculum a course of chemical engineering. The advance in the manufacture of chemicals in the United States during the past 20 years has been marked, not by many changes of processes, but essentially by the new appliances furnished by engineering skill.

The processes used in making chemicals are almost as varied as are the articles produced, but certain leading steps are essential to all, as grinding, furnacing, dissolving, separating, evaporation, filtration, and crystallization. The laws governing chemical constitution are closely followed at each step, and the processes improved and revised, from time to time, by the aid of mechanical contrivances. These changes are rendered more and more necessary as the strong competition of the age sweeps away old and unsuitable appliances.

Many chemical operations demand a long time for the production of finished material. Crystallization is of slow growth in many instances, and decomposition takes place very gradually in others; therefore another reason presents itself for the abnormal amount of capital required to carry on this branch of industry. Both crystallization and decomposition are hastened or retarded by many physical conditions; heat and cold, intense motion, and absolute quietude are in their turn called to the aid of the chemist. When we speak of crystallization we should bear in mind the fact that by this process the great purity of commercial chemical salts is obtained — sometimes, it may be, by frequent dissolvings and as many distinct crystallizations.

The chemical industry takes rank as the fourth among the great manufacturing divisions of the country, the three preceding it being (1) iron and steel, (2) woolen goods, and (3) cotton. (It may be well to explain that cattle-killing, the making of clothing, and of boots and shoes, and any other assembling industries are not considered manufacture proper.) The chemical industry represents a diversity of interests such as centre in no other department, and it affords to the United States a source of activity for labor, skill, and capital that is highly encouraging.

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Henry Bower & Son, Manuf'g Chemists.

Chemical Mineralogy. See MINERALOGY.

Chemical Rays, a not very appropriate name given to the rays of higher refrangibility in the spectrum (q.v.). The blue and violet rays of the spectrum, and also the non-luminous rays at the violet end of the spectrum, have a peculiarly powerful chemical effect on silver compounds,— on photographic paper, for instance, which is prepared by moistening soft paper with solution of common salt, and then steeping it in solution of nitrate of silver. The blue, violet, and non-luminous rays at that end of the spectrum quickly blacken such paper when it is exposed to their influence. The remainder of the spectrum has not this power; for example, paper sensitized with silver salts is not attacked at all by yellow light. Hence the name "chemical rays" is given to those above mentioned. The term is, however, misleading, for there are other chemical compounds that are acted on by other parts of the spectrum; and the truth seems to be that for each particular sensitive compound there is one particular part, or sometimes two or three particular parts of the spectrum with maximum chemical influence for the decomposition of it.

CHEMISTRY

Chemistry, the science which deals with the composition and transformations of matter, had its origin in remote antiquity. In its earliest form it was purely empirical, a mass of disconnected facts which were brought to light in the natural course of development of various industries. In the extraction of metals from their ores, in the preparation of drugs and medicines, in the processes of dyeing, and the like, many chemical data were discovered; and of such facts a large number were known to the ancient Egyptians. Indeed, one plausible derivation of the word "chemistry" is from Khem, an early name for Egypt, which has reference to the blackness of its soil. With this name the Arabic word *chema,* to hide, seems to have some relation; and when we remember that much ancient learning was preserved for us by Arabian scholars, the descriptions of chemistry as the Egyptian science, or as the hidden or occult art, become intelligible. Secrecy was a characteristic of its early practitioners.

The one fundamental fact of chemistry is, that matter can undergo apparent transformations of kind, one substance being converted into another. For instance, wood becomes charcoal, and iron is changed to rust; and facts like these were evident even to the most primitive observers. As philosophy developed, these data were necessarily considered, the nature of matter was discussed, and attempts were made to correlate and explain the phenomena. Much of the early speculation was vague and mystical, and has little significance to-day; but a part of it was intensely practical, and gave a definite purpose to investigation. If matter can be transformed from one substance to another, why should not the possibility of change be universal? All metals, it was seen, had certain properties in common, and so transmutability between them was almost taken for granted. Thus alchemy arose, with its search for the philosopher's stone and its attempts to convert base metals into gold; and from alchemy the chemistry of to-day is lineally descended. The discoveries, even the failures of the alchemists laid the foundations of our modern science, and pointed out the best paths for investigation to follow.

The Greek philosophers, and especially Aristotle, in their attempts to interpret matter, assumed the existence of four elements, namely, earth, water, air, and fire. These names, however, denoted properties rather than things, and implied the attributes of coldness, wetness, dryness, and heat. The properties of matter were determined by these conditions, and could be expressed by the varying degrees under which the latter were displayed. Of chemical combination, as we understand it, the ancients seem to have had no clear conception; they sought to solve the problems of the universe by reasoning alone; the experimental method as a test of truth had not become a court of last appeal. To the alchemists, on the other hand, and to their successors, the iatrochemists, who applied chemistry to medical uses, experiment was the essential thing; and in their hands true knowledge rapidly increased. The alchemical elements, salt, sulphur, and mercury, were still names of properties; but they represented conceptions which stood closer to reality than the earlier ideas, since they were based upon more exact observations. Speculation had not been dethroned, but it was no longer an absolute ruler.

To trace the history of chemistry during its formative period would be impracticable in an article of the present scope. It is enough to say that the modern distinction between elements and compounds was first clearly stated by Robert Boyle in 1661. An element is a substance that cannot be further decomposed, but which is obtainable from a compound body, and from which the latter can again be prepared. He also held that chemical combination consisted in an approximation of the smallest particles of matter, thus adopting the atomic hypothesis which had been current in philosophy from the very earliest times. With these teachings of Boyle modern chemical theory practically began.

The chemical researches of the 18th century were many and varied, but most of them, at least during the earlier decades, were essentially qualitative in character. The fundamental importance of exact weight and measure came into recognition with extreme slowness. Throughout the greater part of the century one theory dominated chemical thought, the theory of *phlogiston,* proposed by Becher, but developed and completed by Stahl. The phenomena of combustion had always attracted the attention of chemists, and the new theory was devised to explain them. Every combustible body was supposed to contain a peculiar non-isolable substance, *phlogiston;* and when combustion took place this substance was thought to be expelled. Thus lead, when heated in the air, undergoes a change analogous to that produced by combustion, and yields a calx, or, as we call it now, an oxide. This calx, combined with phlogiston, was thought to exist in the original metal, and to be freed from phlogiston when calcination occurred. In this speculation no account was taken of the weight of the several bodies, and the fact that the calx was heavier than the metal, that a gain, not a loss was observed, seemed to offer no difficulty to the believers in the phlogistic doctrine. To phlogiston a negative weight was ascribed, and by this device the real difficulties of the problem were comfortably laid aside.

In 1774 Joseph Priestly, himself a believer in phlogiston, discovered oxygen; and so made, though unwittingly, the true interpretation of combustion possible. In 1766 Cavendish had discovered hydrogen; and in 1781 he proved that water was produced by the union of the two new gases. Cavendish also determined the composition of the atmosphere, and in these researches the foundations of a new chemistry were laid. The two chief architects to build upon the foundation were a Frenchman, Lavoisier, and an Englishman, Dalton.

Lavoisier, by careful use of the balance as an instrument of research, proved that matter was constant in weight, and could neither be created nor destroyed. In any chemical change the weight of the substances engaged in the reaction remained unaltered. Studying combustion he showed that it was merely combination with oxygen; and he pointed out that respiration was a phenomenon of the same character. He also gave greater precision to the idea of an element, and announced the elementary nature of the metals; and, in conjunction with

other chemists, did much toward the establishment of a rational system of chemical nomenclature. Hitherto the names of compounds had been arbitrary and often meaningless; now they were made to express with more or less accuracy the composition of the substances described.

Lavoisier died in 1794, a victim of the French Revolution; and it was not until 1803 that the next really great forward step in chemistry was taken by Dalton, who then first announced his famous atomic theory. To support this doctrine, which, being quantitative in form, had little in common with the atomistic speculations of the philosophers, Dalton established two laws, the laws of definite and multiple proportions. That every chemical compound has a fixed and definite composition was recognized by Lavoisier and by other writers before him, but the fact was disputed by Berthollet, and it remained for Dalton to give its statement a precise form. Dalton then went further, and found that to every element a definite combining number could be assigned, and that when two elements united in more than one proportion, even multiples of that number appeared. Thus, taking the hydrogen weight as unity, the standard of comparison, oxygen always combines with other elements in the proportion of eight parts or some simple multiple thereof, and so on through the entire list of elementary bodies. Each one has its own distinct combining weight, and this was a condition which Dalton sought to explain. Fractions of the weights did not occur, fractional atoms could not exist, and the two thoughts were connected by Dalton. Chemical union, to his mind, became a juxtaposition of atoms, whose *relative* weights were indicated by their combining numbers; and so the atomic conception was for the first time given a clear, quantitative expression. First, every element is composed of similar atoms which have constant weight. Secondly, chemical compounds are formed by the union of these atoms in simple numerical relations. Upon these fundamental statements the entire system of chemical philosophy rests, so that for a hundred years the history of chemistry has been the history of the atomic theory. All chemical calculations are based upon the atomic weights of the elements, and in all chemical formulæ they are implied.

Since Dalton's time great labor has been expended upon the exact determination of atomic weights, and in the discovery and description of new elements and compounds. The general conclusions which have been established by this class of researches may be summarized as follows: Every chemical substance is either an element or a compound. The elements, which are not separable into any simpler bodies, at least by no means yet discovered, are comparatively few in number; the compounds are innumerable. More than a hundred thousand compounds are already known. A compound may be separated into its elements or built up from them; and its composition is absolutely invariable. In this respect compounds differ from mechanical mixtures, in which any proportion may occur. Flour and sugar may be mixed together, but they still remain flour and sugar, each with its properties unchanged; no combination here takes place. In combination, as when *gaseous* hydrogen and *gaseous* oxygen unite to form *liquid* water, they do so only in one fixed proportion and the characteristics of the original substances disappear. This fact of combination, the union of two or more bodies to form others which are widely different from them, is clear; but its mechanism is not yet understood. The elementary atoms of the compound are drawn and held together by some form of attraction, but its precise nature is unknown. The object of chemistry is to discover the laws which govern the union or the decomposition of substances, and to determine the limits within which such changes are possible. For the study of compounds, at least for the purpose of ascertaining their composition, two methods are employed. First, *analysis*, in which the component parts of the compound are separated, and individually identified. Secondly, *synthesis*, in which the parts are forced to unite, and to form the compound which happens to be under investigation. Furthermore, analysis may be either *qualitative* or *quantitative*. In one case we merely ascertain what substances are present, in the other we determine their exact quantity. The elements now known, about 80 in number, are given in the following table, together with their atomic or combining weights and their symbols. The latter are abbreviations whose use will be explained presently.

ELEMENTS, SYMBOLS, AND ATOMIC WEIGHTS.

Element	Symbol	Atomic Weight
Aluminum	Al	26.9
Antimony	Sb	119.3
Argon	A	39.6
Arsenic	As	74.4
Barium	Ba	136.4
Bismuth	Bi	206.9
Boron	B	10.9
Bromine	Br	79.36
Cadmium	Cd	111.6
Cæsium	Cs	132.0
Calcium	Ca	39.8
Carbon	C	11.91
Cerium	Ce	139.0
Chlorine	Cl	35.18
Chromium	Cr	51.7
Cobalt	Co	58.56
Columbium	Cb	93.3
Copper	Cu	63.1
Erbium	Er	164.8
Fluorine	F	18.9
Gadolinium	Gd	155.0
Gallium	Ga	69.5
Germanium	Ge	71.9
Glucinum	Gl	9.03
Gold	Au	195.7
Helium	He	4.0
Hydrogen	H	1.0
Indium	In	113.1
Iodine	I	125.90
Iridium	Ir	191.5
Iron	Fe	55.5
Krypton	Kr	81.2
Lanthanum	La	137.9
Lead	Pb	205.35
Lithium	Li	6.98
Magnesium	Mg	24.18
Manganese	Mn	54.6
Mercury	Hg	198.5
Molybdenum	Mo	95.3
Neodymium	Nd	142.5
Neon	Ne	19.9
Nickel	Ni	58.3
Nitrogen	N	13.93
Osmium	Os	189.6
Oxygen	O	15.88
Palladium	Pd	105.7
Phosphorus	P	30.77
Platinum	Pt	193.3
Potassium	K	38.86
Praseodymium	Pr	139.4
Radium	Ra	223.3

Element	Symbol	Atomic Weight
Rhodium	Rh	102.2
Rubidium	Rb	84.8
Ruthenium	Ru	100.9
Samarium	Sm	148.9
Scandium	Sc	43.8
Selenium	Se	78.6
Silicon	Si	28.2
Silver	Ag	107.12
Sodium	Na	22.88
Strontium	Sr	86.94
Sulphur	S	31.83
Tantalum	Ta	181.6
Tellurium	Te	126.6
Terbium	Tb	158.8
Thallium	Tl	202.6
Thorium	Th	230.8
Thulium	Tm	169.7
Tin	Sn	118.1
Titanium	Ti	47.7
Tungsten	W	182.6
Uranium	U	236.7
Vanadium	V	50.8
Xenon	Xe	127.0
Ytterbium	Yb	171.7
Yttrium	Yt	88.3
Zinc	Zn	64.9
Zirconium	Zr	89.9

In addition to these elements there are several others which are as yet imperfectly known and uncertain. Among them, polonium, actinium, holmium, europium, and dysprosium may be named. New elements are not infrequently discovered, and argon, helium, neon, xenon, krypton, and radium have all been brought to light within the last decade.

With the help of the elementary symbols, chemical formulæ can be constructed, and these are of great help in chemical calculations and reasoning. Some of the symbols are initial letters only, as H, O, N, C, for hydrogen, oxygen, nitrogen, and carbon; others are formed of two letters, like Ca for calcium and Zn for zinc. Still others are derived from the Latin names of the metals, such as Ag from *argentum*, silver, Fe from *ferrum*, iron, etc. The formula of a compound is made by writing the proper symbols in juxtaposition, so that NO means a compound of nitrogen and oxygen, HI a compound of hydrogen and iodine, and so on. When two elements form more than one compound, these are distinguished by subscript numerals, as in the examples PCl_3 and PCl_5. In these substances one atom of phosphorus unites with three and five atoms of chlorine respectively. In every case the symbol of an element means one atom of the element, and therefore that relative quantity of it which is indicated by its atomic weight. In water, H_2O, two atoms of hydrogen weighing two units, combine with one atom of oxygen weighing in round numbers sixteen units; and thus the formula tells us in shorthand that the compound contains two parts of one element to sixteen of the other. No matter how complex a formula may be, this simple rule invariably applies, and by its means the composition of the substance represented can be calculated. The symbols, moreover, can be combined into equations, from which we may compute the outcome of a given chemical process. This subject, however, is much too abstruse for discussion here. Its details are developed logically from the atomic theory.

To the philosophers who preceded Dalton an atom was the smallest particle of any substance which could possibly exist. Thus water might be subdivided and subdivided until, in theory, a limit was attained, and an atom of water was the result. By chemical means a new order of divisibility had now to be recognized, and the supposed «atom» of water was itself found to be complex, and separable into still smaller particles of oxygen and hydrogen. The latter are the atoms of the chemist; the former clusters of atoms are known as *molecules*. This distinction was not developed immediately; its full recognition came slowly, and it derived its importance from certain laws relative to gases which were discovered, partly by Boyle, partly by Gay Lussac, and generalized in 1811 by Avogadro. Avogadro's law may be concisely stated as follows: Equal volumes of gases under like conditions of temperature and pressure, contain equal numbers of molecules. A molecule is now defined as the smallest particle of any substance which can separately exist; an atom as the smallest particle which can take part in chemical change. Another law, discovered by Dulong and Petit in 1819, was also highly important, for it was shown that the specific heat of an element was inversely proportional to its atomic weight. In other words, the elementary atoms have all the same capacity for heat, and this rule gave us an important check in ascertaining the true weights of the atoms. The law of Avogadro and the law of Dulong and Petit were brought together by Cannizzaro in 1858, and the system of atomic weights and chemical formulæ now in use, which differ in certain essential particulars from those that were first adopted, was the result of the combination.

In the early days of scientific chemistry the science was divided into two great sections, organic and inorganic, the one dealing with animal and vegetable products, the products of life, and the latter with substances derived from the mineral kingdom. Inorganic chemistry, the chemistry of the metals, the earths, the commoner oxides, bases, and salts, was for the time being the simpler, and during the first half of the 19th century it received the lion's share of attention. At first it was supposed that the two fields of research were absolutely distinct, and that no organic compound could be derived by artificial means from inorganic sources. This belief was overthrown by Woehler, in 1827, who showed that urea, an organic body, was easily prepared from inorganic ammonium cyanate, and since then a vast number of organic syntheses have been effected. Curiously enough, urea and ammonium cyanate, although very different substances, have the same percentage composition, containing the same elements in exactly the same proportions. Later it was found that *isomerism*, as this semi-identity is called, was exceedingly common, and here was a noteworthy phenomenon which called for explanation. Different molecules could be constructed from the same set of atoms, and the simplest interpretation of the fact was that the latter were differently arranged. Out of the same bricks different houses may be erected. The conception of *chemical structure*, therefore, came into being. What is the arrangement or grouping of the atoms within any given molecule?

The earlier attempts at the solution of this

problem have now only historical interest, and their consideration is of value to professional students of chemistry alone. If we were to trace the successive stages we should find evidence of a systematic growth in chemical theory; but definiteness was hardly possible until after Cannizzaro had established the true system of atomic weights, and formulæ had been adjusted in accordance with them. Between 1850 and 1860, however, a new property of the atoms began to be recognized, and this, taken in connection with the formulæ based on Avogadro's law, was the key to the problem. The theory of *valence,* which is the expression of the newly discovered property, is as follows. Every atom, as regards its union with other atoms, has a certain atom-fixing power, which is known as its *valency,* or *valence.*

Let us take hydrogen as our standard of reference and consider some of its simplest compounds. In HCl, hydrochloric acid, one atom of hydrogen is united to one of chlorine. So also we have HBr, and HI, KCl, and NaCl, AgBr, etc. These elementary atoms, which combine only in the ratio of one to one, at least to form permanent compounds, are *univalent,* that is, their power of fixing or uniting with other atoms is unity. In water, on the other hand, H_2O, a single oxygen atom holds two of hydrogen in combination, and so oxygen is called a *bivalent* element. In H_2S, $CaCl_2$, ZnI_2, we have illustrations of still other compounds in which a bivalent atom is united with two of the univalent type. Nitrogen, phosphorus, arsenic, aluminum, and some other elements go still farther, and are *trivalent,* so that the compounds formed by them have such formulæ as NH_3, PH_3, AsH_3, $AlCl_3$, and so on. Carbon, a *quadrivalent* substance, forms normally compounds of still more complex type, such as CH_4, CCl_4, or, when it unites with two *dyad* or bivalent atoms, CO_2 and CS_2. For brevity, the valency of the various elementary atoms may be indicated by speaking of them as *monads, dyads, triads, tetrads,* etc. The rare metal vanadium is a *pentad,* having a valency of five, and *sexivalent* tungsten is a *hexad.* In many cases valency seems to be a variable property of the atom, as, for example, when we consider the two chlorides of phosphorus, PCl_3 and PCl_5. In cases like these the higher figure may be taken as showing the maximum atom fixing power of the element, a power which is only partially exercised in the lower compounds.

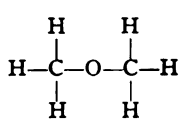
In the theory as thus stated there is no mere speculation; it is a statement of definitely observed facts. It tells us that the atoms unite, not arbitrarily, but in accordance with certain rules; and these help us in our comprehension of known compounds and the discovery of new ones. Indeed, an enormous advance in chemical discovery followed the application of these principles: an advance not only of scientific importance, but of economic and commercial value also. It was in the domain of organic chemistry that the growth became most immediately evident, and to this branch of the science we may now turn our attention. It is here that we find the best illustrations of what is meant by chemical constitution or structure, and the best examples of isomerism.

It has already been pointed out that organic chemistry, in its beginnings, dealt with animal and vegetable substances, the products of living organisms. Other artificial bodies, derived from these, were also included in its territory. All organic compounds were characterized by the presence in them of carbon, this element being ordinarily combined with hydrogen, oxygen, nitrogen, or all three, and sometimes with other elements also. Organic chemistry, as its domain was enlarged, in time received a new definition, and to-day the term broadly signifies *the chemistry of carbon compounds.* It is true that some compounds, such as the metallic carbonates, are more conveniently described as inorganic in character; but these minor exceptions affect the definition but slightly.

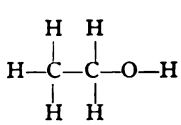
At first sight the almost innumerable organic substances appear to be hopelessly complex, and some, indeed, such as albumen, are so; but a closer inspection reveals order among them, and, in general, an ultimate simplicity. Their great number is due to the fundamental properties of the carbon atom, which, being quadrivalent, can unite with four other atoms simultaneously; and which, moreover, may combine with other atoms of its own kind to form rings or chains that serve as nuclei for the development of long series of substances. Most of the latter are derived from *hydrocarbons,* compounds of carbon and hydrogen, and these are exceedingly numerous. Marsh gas or methane, CH_4, contains the largest proportion of hydrogen, and is the type upon which the quadrivalency of carbon is predicated; it is, furthermore, the first member of a series of hydrocarbons, CH_4, C_2H_6, C_3H_8, and so on up to $C_{35}H_{72}$, and perhaps even farther. In this series each compound contains one atom of carbon and two of hydrogen more than the hydrocarbon preceding it, and this regular difference establishes what is known as an *homologous* series. Nearly all organic substances can be arranged in series of this kind, so that the chemist is able to master a great number of details by a single effort of the memory. Moreover, the members of each homologous series vary regularly, step by step, in their physical properties. Thus CH_4 is a gas, C_2H_6 a heavier gas, C_5H_{12} a volatile liquid, the following terms are liquids which grow less and less volatile, while above $C_{16}H_{38}$ the hydrocarbons are waxy solids. Ordinary paraffin is a mixture of these higher hydrocarbons, and the whole group, therefore, is known as the paraffin series. Common petroleum consists chiefly of its liquid members. From these hydrocarbons, with oxygen, a parallel series of *alcohols* is derived: such as CH_4O, methyl or wood alcohol, C_2H_6O, ethyl or ordinary alcohol, $C_5H_{12}O$, amyl alcohol or fusel oil, etc. By further oxidation the alcohols yield a set of acids, among which acetic acid, the acid of vinegar, is the one most familiarly known. This single series of hydrocarbons is the key to thousands of other substances which are directly producible from them. Some of these products illustrate very simply a mode of derivation which is known as *substitution,* as when, from CH_4, hydrogen atoms may be successively withdrawn and replaced by univalent atoms of chlorine. Thus we get the following compounds: CH_4, CH_3Cl, CH_2Cl_2, $CHCl_3$, and finally CCl_4; the fourth one being the familiar body chloroform. So also acetic acid, $C_2H_4O_2$, by substitution with chlorine, gives $C_2H_3ClO_2$, $C_2H_2Cl_2O_2$, and $C_2HCl_3O_2$; but here

the process stops and cannot be carried further. The one remaining atom of hydrogen in acetic acid is differently combined from the others, and here we begin to see the sort of evidence by which differences of chemical structure may be determined. When we study great numbers of organic compounds, especially with regard to their possibilities of chemical change, we find that certain combined atoms behave differently from other combined atoms of like kind. We also discover groups of atoms which can be shifted collectively from compound to compound; clusters which act almost like elements and are perfectly definite in their nature. The group NH_4 is so much like a metal in its compounds that it is given a distinct name, *ammonium*, and is conventionally treated as if it were really a metallic body. CN, cyanogen, resembles chlorine in some of its relations, and such groups as CH_3, methyl, and C_2H_5, ethyl, are encountered at every turn. They do not exist separately, but only in combination, and are known as *compound radicles*. Every such radicle has valency, and this is essentially residual in its nature. Thus in methyl, CH_3, three of the four units of affinity belonging to the carbon atom are satisfied by hydrogen, leaving one unit unemployed. Methyl, therefore, is a univalent radicle, and acts almost as if it were an independent element.

The chemical formulæ which we have so far considered belong to the class known as *empirical formulæ;* they give the number and kind of atoms in a molecule, but tell nothing as to their arrangement or mode of union. With the conception of valency and a knowledge of radicles we are now prepared to construct *rational* or *constitutional* formulæ, and from these it is possible to infer what sort of changes a given molecule can undergo, and to understand wherein isomeric bodies differ. For example, there are two bodies having the empirical formula C_2H_6O; one, methyl ether, is a gas; the other, common alcohol, is liquid; the great difference between them is evident at a glance. Their rational or structural formulæ exhibit the cause of difference as follows:

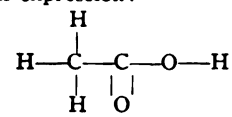


Methyl ether.



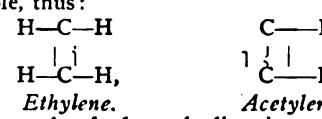
Ethyl alcohol.

In the first, two methyl groups appear united by an atom of oxygen; in the other, the carbon atoms are directly combined, and the bivalent oxygen connects carbon and hydrogen. The lines which connect the symbols represent units of valency, and the groups CH_3 in one case and C_2H_5 in the other stand for well-known radicles. For further illustration we may recur to the case of acetic acid, in which, as we have seen, three hydrogen atoms behave differently from the fourth. This condition is shown in the following structural expression:



Here we see the three replaceable atoms directly connected with carbon, while the fourth is linked to oxygen; the latter element also being combined in two ways. The known facts are clearly and simply presented to the eye by a convenient symbolism, a method of formulation which has been of immense value as a guide to practical research. In order to succeed, an experiment upon any of these compounds must be in accord with the facts of molecular structure, for the latter indicate limitations which cannot be disregarded.

In two of the foregoing formulæ the linking of carbon with carbon is clearly indicated, but only by single units of valency, or *bonds* as they are sometimes called. In other cases, however, more complex unions occur, and double or triple linkages are common. The formulæ for two hydrocarbons may be cited to illustrate this principle, thus:



Ethylene. *Acetylene.*

The second of these bodies is now widely known as an illuminating gas. Each compound is the starting point of an homologous series, exactly as with the paraffins; but the ethylene series exhibits a striking peculiarity. If we add to ethylene successive CH_2 groups, which characterize chemical homology, we get a sequence represented by such formulæ as C_2H_4, C_3H_6, C_4H_8, and so on indefinitely. In all of these compounds the ratio between carbon and hydrogen is the same, and their percentage composition is identical; such a series is called *polymeric*. The different members of the series, however, yield different derivatives, and they are further distinguished from one another by their *molecular weights*, the weight of the molecule being the sum of the weights of the atoms contained in it. These molecular weights can be directly measured by ascertaining the actual weight of definite bulks of the several substances in the condition of gas or vapor. According to Avogadro's law, equal volumes of gases contain equal numbers of molecules; if, therefore, a litre of one gas is twice as heavy as a litre of another, the weight of its molecule must be double that of the latter. By experiment, then, we can determine the relative weights of molecules, and so discover whether a compound is formed from a larger or smaller group of atoms.

One other class of organic substances demands attention here, the so-called *aromatic bodies*, which start from the hydrocarbon C_6H_6, benzene. In the compounds previously considered the carbon atoms are united in a chain-like manner, but in benzene there is good reason to assume that they form something like a ring. Around this ring of carbon atoms the hydrogen atoms are grouped, and by successively replacing them with other atoms or radicles, a myriad of substances may be generated.

The details of this theory, which was put forth by Kekulé in 1866, are too abstruse for full development here, but its influence upon chemical research and chemical industry has been overwhelming. From benzene, which is a product of coal-tar, aniline is produced; and the derivatives of aniline give us a perfect rainbow of artificial dyes. To benzene, other hydrocarbons are closely related, and their derivatives are often curiously interesting. Among them we have artificial indigo and artificial alizarin, the latter being the coloring principle of madder. Both compounds are identical with the natural substances, and both are important commercial products. Medicines, like saccharin, antipyrin, acetanilid, and phenacetin; perfumes, like musk and violet; and flavoring substances, such as vanillin, are now prepared by synthesis from the hydrocarbons of coal-tar, and thousands of workmen find employment in the new industries which are based upon these processes. The investigations which created these new sources of wealth have been in great part guided by theoretical considerations, and at the very foundation of all this work we find the conception of chemical structure, and Kekulé's interpretation of the constitution of benzene. The atomic groupings represented by the structural or rational formulæ are not visionary, and their study has led to the greater material well-being of mankind.

It must not be supposed that the rational formulæ represent the arrangement of the atoms in space, for that is not their purpose. It is not likely that the atoms of a molecule all lie in one plane, and yet these formulæ suggest no other mode of grouping. The tridimensional structure of molecules is, generally speaking, almost entirely unknown; and yet, in certain cases, there are clues to a partial solution of the problem. Various organic substances have optical properties which are easiest explained by assuming that the atom of carbon is essentially a tetrahedron in form, and that its four valencies are forces exerted from the centre toward the four solid angles of the body. By means of this hypothesis many curious facts are interpreted, and many new discoveries have been made. Formulæ based upon the tetrahedral carbon atom are called *stereochemical* formulæ, and the study of their space relations is named *stereochemistry*. This subject is quite modern and does not admit of detailed discussion here.

That the elements are connected with one another by various relationships is a fact which was early recognized; they were therefore soon classified into groups according to their likenesses. Thus chlorine, bromine, and iodine are closely allied, and form strikingly similar compounds; lithium, sodium, and potassium resemble one another very clearly, and so too do the metals, calcium, strontium, and barium. Such a grouping was of great service in classifying many chemical facts, and in due time it was seen to be related to the property of valency. A general law connecting all the elements was, however, not discovered until the decade ending in 1870, during which time three investigators, Newlands, Mendeleéf, and Lothar Meyer, working independently, developed the *periodic system*. Upon arranging the elements in the order of their atomic weights, a regular periodic variation in their properties appeared, and the fullest interpretation of it was due to Mendeleéf. The nature of his work may be partly shown as follows:

Beginning with lithium and arranging the elements in the order above indicated, a table of the following form can be constructed, although only three lines of it are given here:

I.	II.	III.	IV.	V.	VI.	VII.	VIII.
Li.	Gl.	B.	C.	N.	O.	F.	Ne.
7.	9.	10.9	11.9	13.93	15.88	18.9	19.9
Na.	Mg.	Al.	Si.	P.	S.	Cl.	A.
22.88	24.18	26.9	28.2	30.8	31.8	35.2	39.6
K.	Ca.	—	Ti.	V.	Cr.	Mn.	etc.
38.9	39.8	—	47.7	50.8	51.7	54.6	

Under the symbol of each element its atomic weight is written, rounded-off, in some cases, for convenience. Let us now consider the first line. Lithium, which begins the scheme, is univalent, glucinum bivalent, and carbon quadrivalent, a regular increase in valency. Nitrogen is in its stablest compounds trivalent, oxygen bivalent, and fluorine univalent; thus showing a steady decrease. Neon, which was not known in Mendeleéf's time, and argon, which falls just below it, are elements of *no* valency, and these form no compounds. These elements, with their regular rise in valency to carbon and fall to neon, form a single period. In the next line, beginning with sodium (Na), the process is repeated; and this happens again in the third line; so that all of the elements in the same vertical column are alike in valency and intimately related in their properties and their compounds. Regular step-by-step variation horizontally, and likewise vertically, characterizes the table, which may, with certain qualifications, be extended so as to include all the elements known.

At the third place in the third line of the table, as given above, a blank appears. This place, when Mendeleéf developed his *periodic law*, was occupied by no known element; and in the fourth period of the completed scheme two similar gaps occurred. These indicated unknown elements, and Mendeleéf, from the properties of the adjacent elements, predicted what their properties should be. Since then the prediction has been verified; and three new metals, having all the properties which Mendeleéf foresaw, fill the vacant places. They are scandium, gallium, and germanium. The connection between the elements was more intimate than anyone had supposed, so much so that the unknown could be accurately prophesied. All physical properties appear to rise and fall from element to element in this regular periodic way; and we can now see what sort of elements are likely to be discovered in the future, and where they will stand in the tabular arrangement. The properties of an atom, thermal, electrical, optical, etc., seem to be in great measure dependent upon its weight. The distinctly chemical property of the atom, its valency, may be related to its form, as stereochemical evidence would seem to indicate; but here we have few facts to go upon, and speculation would be premature.

The wonderful regularities of the periodic law, with its verified predictions, lead us at once to reiterate the old question as to the ultimate nature of matter. Is it really various in kind, or is it at bottom only one? Are the elements, in the last analysis, elementary? To

such questions no final answer can yet be given, but they cannot be silenced; and one of the most marvelous discoveries of science has some bearing upon the problem.

When a beam of white light passes through a glass prism, it is broken up into a bundle of rays which give to the eye the so-called seven primary colors. If this phenomenon be observed through the form of instrument called a *spectroscope,* a continuous band of color is seen ranging from red at one end to violet at the other. Suppose, now, that instead of examining white light, we repeat the experiment with a colored flame and see what will happen. Sodium compounds, for instance, when introduced into a non-luminous gas flame, give out an intense yellow light; and this, viewed through a spectroscope of low power yields a *spectrum* consisting of a single, narrow, yellow line. Lithium, under similar conditions, exhibits a red line; barium, a group of several green and yellow lines; and, in short, every substance which is capable of coloring a flame gives a spectrum which is not continuous. Each spectrum is made up of bright, colored lines, with dark spaces between; and every line is absolutely characteristic of its source. Every element, provided it be first heated hot enough to be converted into vapor, yields its own definite spectrum of one or many lines, which can be recognized in a spectroscope. The vapor of iron, as obtained in an electric spark between iron terminals, gives a spectrum containing a multitude of bright lines, and every one of them belongs only to iron. The process by which substances are thus identified is known as *spectrum analysis;* and it was discovered by Bunsen and Kirchhoff a little over 40 years ago. Bunsen applied the method to the analysis of the salts contained in a mineral water, and saw lines which belonged to no known element. He was thus led to find two new metals, rubidium and caesium, and soon afterward, by similar means, other chemists discovered thallium and indium.

Shortly after its invention the spectroscope was turned toward the heavenly bodies, in order to see what tales their light had to tell. It was at once found that they are all composed of matter like that with which we are familiar on the earth, although varying in complexity. The sun was proved to be an intensely heated body, containing a large number of our chemical elements in gaseous form, and the fixed stars were similar in character. The whiter and hotter stars contain comparatively few substances, the colored and cooler stars contain more. The nebulæ, those bodies which represent the first step in the formation of planets and systems, were found to be vast clouds of incandescent gaseous matter, in which hydrogen and nitrogen predominated; chemically, therefore, they were extremely simple. From the simplest nebula to the complexity of our earth there was regular chemical gradation, suggesting that the evolution of the one from the other had been accompanied by an evolution of the so-called elements also. A strong argument in favor of the unity of matter was thus brought to light, even though absolute proof was wanting. The general opinion now is that our elements are really complex, although our present resources are not adequate to decompose them.

Very recently this opinion has been strengthened by a group of remarkable discoveries connected with the rare metals, thorium and uranium. These elements and their compounds were found to emit invisible radiations, or emanations, which affect the photographic plate, and also possess certain measurable electric properties. This trait of *radioactivity,* as it is called, led to the discovery of two or three new metals, which are associated in the mineral kingdom with uranium, and one of these, radium, has the new power to an extraordinary degree. The radiations are of several kinds; and are still the subject of active investigation; but one or two of the conclusions so far reached are pertinent to the present discussion. In the case of thorium, according to Rutherford, the emanation consists of chemically inert gaseous particles which are continually being generated and given off from the parent material. The element thorium seems to contain something which is not thorium. So also J. J. Thomson, studying electrified gases, is led to the conclusion that the negative charge resides upon certain *corpuscles,* as he terms them, which are not more than the thousandth part of an atom of hydrogen in magnitude, and which are the same for all substances. Particles smaller than the chemical atom are thus being identified, and so the belief in the actual complexity of the elements is receiving close attention.

Although the principles of valency and the conception of chemical structure are best developed and exemplified in the study of organic compounds, the inorganic side of chemistry is by no means to be neglected. Here we find the simplest illustrations of chemical nomenclature, and some of the greatest fields of industrial activity. Sulphuric acid, soda, bleaching powder, and many other inorganic substances are of immense commercial importance; and the processes by which metals are extracted from their ores all fall within this department of chemistry. Information upon these practical subjects will be found elsewhere, under the proper headings, such as IRON; PHOSPHORUS; SALT; SODA; etc.; but a few general notions belong here.

The nomenclature of inorganic chemistry is quite simple. Compounds of two elements are described by giving their names and adding the termination *ide* to part of the second title. For example, copper unites with oxygen to form copper *oxide;* zinc and chlorine give zinc *chloride,* and so on, the names thus expressing the composition of the substances. When multiple proportions appear a numeral prefix is added to the class name, so that we have such combinations as iodine *mono*chloride, ICl, iodine *tri*chloride, ICl_3, and the like. In some cases this mode of nomenclature is varied, as when certain well-defined classes of compounds are to be described. Thus we have the iron compounds $FeCl_2$ and $FeCl_3$ (the symbol Fe from ferrum), which are commonly called *ferrous* and *ferric* chloride respectively. The terminations *ous* and *ic* denote lower and higher stages of union and are used for convenience or euphony when the regular nomenclature might be awkward. Such compounds as PCl_3 and PCl_5 may be named either phosphor*ous* and

phosphor*ic* chloride, or phosphorous trichloride and pentachloride, according to preference; but the latter form is the more precise and clear. Any compound of a metal with oxygen, then, is an *oxide;* with chlorine, a *chloride;* with sulphur, a *sulphide,* etc.

Three of the largest and most important classes of compounds are *acids, bases,* and *salts.* In order to define these rigorously, some previous knowledge of chemistry is required; but an indication of their character is easily given. The acids, as their name implies, are usually sour in taste, but not invariably so, and the stronger members of the class are violently corrosive and able to dissolve metals. They are most commonly derived from the non-metallic elements, and several acids may be formed from one of the latter. Here again we have the *ous* and *ic* nomenclature, as in sulphur*ous* acid, H_2SO_3, and sulphur*ic* acid, H_2SO_4; the latter containing the higher proportion of oxygen. From nitrogen we get nitr*ous* and nitr*ic* acids, HNO_2 and HNO_3, and so on with simple descriptive names throughout the long list of these compounds.

The *bases* are the direct opposite of the acids in their properties, and have, when soluble in water, an alkaline or soapy taste. The taste of ordinary kitchen soda is a good example of this peculiarity. Certain vegetable coloring matters are changed in hue by acids and alkalies, the latter name being applied to the stronger soluble bases. Blue litmus, for instance, becomes red in contact with an acid, but an alkali restores its original tint. When acid and base are mingled in proper proportions, they *neutralize* each other, and a *salt* is produced which no longer affects litmus. To illustrate further: soda is a base, and when it is mixed with sulphuric acid it generates sodium *sulphate.* With sulphurous acid it yields sodium sulph*ite;* and the two terminations *ate* and *ite* correspond to the other terminations *ous* and *ic.* Nitric acid, with bases, forms nitrates; acetic acid, acetates, etc., the nomenclature being simple and easy. Many of the salts are important commercial articles.

From one point of view an acid is a substance which contains hydrogen replaceable by a metal, and a salt is the compound so produced. Zinc, for instance, dissolves in sulphuric acid to form zinc sulphate, and free, gaseous hydrogen, is liberated. An acid, then, contains hydrogen plus something else, and the latter is a distinct radicle in each case which exhibits a definite valency. The subjoined formulæ may help to make this point clear:

Nitric acid.	*Sulphuric acid.*	*Phosphoric acid.*
HNO_3.	H_2SO_4.	H_3PO_4.
Potassium nitrate.	*Potassium sulphate.*	*Potassium phosphate.*
KNO_3.	K_2SO_4.	K_3PO_4.

That is, potassium (symbol K from kalium) replaces hydrogen atom for atom; and the radicles NO_3, SO_4, and PO_4 are univalent, bivalent, and trivalent respectively. A knowledge of these simple principles enables the chemist to classify the facts in his mind, and to write numberless formulæ without overloading his memory with details. Learning these principles is like learning a language, only the grammar is easy of acquisition. Fluency in its use can only be gained by practice.

Between allied departments of science no sharp dividing line can be drawn, and this is peculiarly true with respect to chemistry and physics. The two sciences merge one into the other by imperceptible gradations, and neither can be fully understood separately. Physics treats primarily of the different forms of energy, light, heat, electricity, mechanical force, etc., and all of these appear in the phenomena of chemical change. Furthermore, chemical substances are described in physical terms, and are identified by physical properties such as weight, color, specific heat, melting point, boiling point, electrical conductivity, and the like. Considerations of this kind have received much attention during recent years, more than ever before; and so a great department of knowledge has been developed, known as *physical chemistry.* Avogadro's law, the periodic law, and the revelations of the spectroscope all fall partly within this field, but other important portions of it deserve some notice here.

Between chemical change and heat the relation is exceedingly intimate. No chemical change takes place without either the liberation or the absorption of heat, and every one is in some measure dependent upon temperature. At very low temperatures, like the temperature of liquid air, all chemical action ceases, and the most oppositely energetic substances lie side by side indifferent to one another. At very high temperatures all unions are broken up, and here again the chemical forces cease to be operative. Most of the changes which we observe are effected at ordinary temperatures, and a slight warming may rouse an apparently inert mixture to chemical activity. The application of heat, then, may either instigate or prevent chemical union, according to circumstances.

As a general rule, with some apparent exceptions, every chemical union develops heat and every decomposition absorbs it; and the study of these relations has received the special name of *thermochemistry.* Furthermore, every chemical change is attended by its own special, definite quantity of heat, and these quantities vary from substance to substance. Hydrogen, burning, that is, combining with oxygen, gives out the largest amount of heat of any substance known; carbon yields much less, phosphorus or sulphur less still, weight for weight being consumed. For such reasons the heat value of any fuel depends upon its chemical composition, and hence careful analyses of coal, which is a variable mixture containing chiefly carbon and hydrocarbons, have great practical importance. From the composition of a coal its *calorific value* may be calculated, although a direct experimental measurement of it is to be preferred. In general laws, however, thermochemistry is still rather deficient, and its larger meanings are yet to be discovered.

Like heat, radiant energy, the energy of light, may cause either chemical union or chemical decomposition. Hydrogen and chlorine, mingled in cold and darkness, do not readily unite, but upon sudden exposure to strong sunlight they combine with explosive violence. On the other hand, silver salts, under suitable conditions, are broken up by light, and upon this fact the art of photography is founded. The

photographic film is a laboratory in which light is the chemist. We have already seen, in considering spectrum analysis, that every substance, when intensely heated in the form of gas or vapor, emits light which is peculiar to itself; but there are still other relations between matter and light that have chemical importance. Color is merely the capacity for selecting or absorbing certain rays, and rejecting or transmitting others; and this is often a characteristic distinction between various classes of compounds. For example, salts of cobalt are commonly red, of nickel green, of copper blue or green, and so on. Many of the optical properties of substances seem to depend upon their chemical composition, and in one set of phenomena this fact has economic importance. Certain bodies have the power of twisting or rotating a ray of polarized light, and among carbon compounds this property is directly connected with stereochemical structure. Sugar is one of these optically *active* compounds, and by measuring the amount of rotation which a sample can produce its degree of purity may be determined. This process is practically applied in all sugar refineries for estimating the value of raw sugars or syrups, and also in assessing customs duties. The polariscope used for such purposes is often called a saccharimeter.

Of late years chemistry has been greatly developed upon its electrical side, both theoretically and practically. Electricity may be generated by chemical change, and this happens in all forms of the galvanic battery. For many years, previous to the perfecting of the dynamo, batteries of that class supplied all the electrical power that had any industrial significance. Electricity may also produce chemical change, and it is especially effective in bringing about decompositions. Indeed, many thinkers have sought to identify chemical attraction or affinity with electricity, and even the property of valency is often ascribed to electrical charges carried by the atoms.

From a purely chemical point of view, probably the most important electrical phenomena are those of *electrolysis.* When a current of electricity passes through a compound solution, the latter undergoes decomposition, and the dissolved substance, acid, base, or salt, is separated into two parts which move with unequal velocities in opposite directions. The conducting liquid is called an *electrolyte,* and the separated parts, or rather particles of the compound in solution, are termed its *ions.* One ion is positively, the other negatively electrified, and hence they tend to accumulate around the opposite poles. Under suitable conditions, the separation can be made permanent, and this fact is the basis of all our processes in electrometallurgy. From solutions of gold, silver, copper, nickel, etc., the metal is electrically set free, to be deposited upon properly arranged surfaces. Electroplating and electrotyping are operations of this kind. In the electric furnace, however, the electricity acts as a source of heat, and the latter is the effective decomposing agent. In manufacturing chemical preparations many electrolytic processes are now employed. In liquids which do not conduct a current electrolysis does not take place.

Suppose, now, we employ several precisely similar currents to effect a variety of electrolytic changes. Let one current liberate hydrogen from water, another deposit silver, another copper, and so on. Then, upon measuring the quantities of the different substances which have been set free, we shall find them to be exactly proportional to their *chemical equivalents,* an equivalent being the ratio between the atomic weight of an element and its valency. For univalent elements the atomic weights and equivalents are identical, for bivalent elements the equivalent is half the atomic weight, and so on through the list. If, then, one gram of hydrogen is liberated, the same current in the same time will deposit 107.11 grams of univalent silver, or one half of 63.1 grams of bivalent copper, etc. This fundamental proposition of electrolysis is known as Faraday's law. Furthermore, the separated ions all carry equal electrical charges per unit of valency, 96,500 coulombs for a univalent ion, and twice that for a bivalent ion. The relation between electrical and chemical phenomena is of the very closest kind, and Faraday's law is absolutely general.

When two or more substances act upon one another chemically, the entire process is termed a *reaction.* Very many of the reactions which are observed in the laboratory take place between bodies in solution, and hence the study of solutions has received and is still receiving a great deal of attention. No complete theory of solutions has so far been developed; why one substance should dissolve easily in water, another slightly, and a third not at all, remains unexplained; but some generalizations have been reached, and these are of the most suggestive character. Some of the phenomena are electrolytic in their nature, and others go to prove a remarkable parallelism between bodies in solution and bodies in the gaseous condition.

In Avogadro's law the volume of a gas is defined by conditions of temperature and pressure, and equal numbers of molecules occupy equal spaces. The power of exerting pressure is one of the distinct properties possessed by all gases, and this is a consequence of the fact that the molecules are in rapid and continuous motion. Substances in solution are also found to exert pressure, and the latter can be measured by various means. The pressure is proportional to the strength of the solution, and although it is not easily detected, it is often very great. The movement of the sap in a plant is due to the *osmotic pressure* of the dissolved substances that it contains. In 1887 Van t'Hoff, studying these phenomena, deduced from them the simple law that equal volumes of solutions, at equal osmotic pressures, contain equal numbers of molecules, and Avogadro's law was directly paralleled. A body in solution and a gas obey precisely similar laws. We have already seen that from the actual weight of a gas its molecular weight can be determined. Now, from the behavior of substances in solution their molecular weights can also be ascertained. A saline solution does not freeze so easily as pure water, and its boiling point is higher; the depression in one case and the elevation in the other being proportional to the molecular weight of the dissolved substance. These facts are directly connected with Van t'Hoff's generalization, and they are now of almost daily application in scientific research. The actual measurement of

molecular weights has been enormously extended by means of the new laws.

Both gases and solutions, however, sometimes exhibit apparent anomalies. Certain compounds, when vaporized, seem not to agree with Avogadro's law, and such facts require explanation. The seemingly anomalous substances, as such, do not exist in the state of vapor, but are split up, or *dissociated,* into other things, For example, ammonium chloride, NH_4Cl, above a certain temperature, is decomposed into a mixture of two gases, hydrochloric acid and ammonia, $NH_3 + HCl$, which, on cooling, reunite and reproduce the original compound. Twice as much vapor as is required by theory, and specifically half as heavy, is produced by this transformation, which is but one of a large class, all well understood.

In the case of solutions it was found that many compounds, especially the acids, bases, and metallic salts, caused a lowering of the freezing point that was twice as great as should be expected. Here again a splitting up of molecules, a true dissociation, exactly like that observed in gases, had occurred. Furthermore, the anomalous compounds were all electrolytes; that is, their solutions conducted electricity and were electrolytically decomposed; while normal substances, like sugar, were not. Solutions, then, were to be divided into two classes, differing electrically, and also dissimilar in their relations to Van t'Hoff's law. The explanation of these differences is given by Arrhenius in his theory of *electrolytic dissociation.*

As interpreted by this theory, an electrolyte, when dissolved, is dissociated into its *ions,* partially in a strong solution, and entirely in one which is infinitely dilute; a statement which leads to some remarkable conclusions. For instance, the ions of common salt, sodium chloride, are atoms of sodium and chlorine. In a dilute solution the salt itself ceases to exist as such, while atoms of sodium and of chlorine wander about, chemically separated, but still in equilibrium with each other. Sodium sulphate may be regarded as made up of two parts, sodium ions and ions of an acid radicle, SO_4, and these are severed apart during solution to move about independently. According to this view electrolysis is not primarily a decomposition of the salt: it is rather a sorting out of the already uncombined ions, which receive different electrical charges and concentrate separately at the two electrical poles. Some ions are single atoms, others are more or less complicated groups such as CO_3, SO_4, NO_3, PO_4, etc., which cannot be, or at least have not been, independently isolated.

In the study of chemical reactions the ionic theory of Arrhenius has been fruitfully applied. By means of it we are now able to better discriminate between acids and bases, and to interpret more rationally the phenomena of neutralization. Acids are all characterized by the presence in their solutions of hydrogen ions, single atoms with a univalent radicle two atoms for each bivalent radicle, etc. Thus in hydrochloric acid the ions are H and Cl; in sulphuric acid $2H$ and SO_4, and in phosphoric acid $3H$ and PO_4. In bases, on the other hand, ions of *hydroxyl* exist, and this is a radicle of the formula HO, in which the bivalent oxygen is only half combined. Caustic soda, NaOH, for example, dissociates in solution into the ions Na and HO; caustic lime, CaO_2H_2, into Ca and $2HO$, and so on. When a dissolved base and a dissolved acid are brought together, the H ions of the latter and the HO ions of the former combine to form water, H_2O, and vanish from the reaction. The salt which is produced is represented by the remaining ions, and as the characteristic features of acid and base are gone, the result is neutral. Nearly all reactions in solution, but not quite all, are reactions between ions rather than between the actual compounds with which we originally began.

In the time of Lavoisier chemistry was hardly more than a minor subdivision of natural philosophy. It was just coming into recognition as a true science, and its votaries were few. Its great development has taken place in little more than a century, and now it touches many other branches of knowledge, affects all departments of industry, and gives employment to tens of thousands of men. In every part of it there is intense activity, and discovery follows discovery faster than they can be assimilated. Mineralogy is to all intents and purposes a branch of chemistry, for minerals are classified upon the basis of their chemical composition, and the first step toward the establishment of a new species is its chemical analysis. Physiology is in great part a chemical science; respiration, assimilation, and excretion are chemical processes; within the living organism, plant or animal, substances are undergoing transformations which only the chemist can follow or identify. The chemistry of vital processes, *biochemistry,* is almost a science by itself, so large is its field and so varied are the problems with which it has to deal. Medicine is indebted to chemistry for almost a new pharmacopœia, for not only have new remedies been created, but in place of old drugs, crude and bulky, the compact and more elegant active principles are now employed. Anæsthetics, such as ether, chloroform, and nitrous oxide; hypnotics like chloral; the remedies derived from coal-tar; and alkaloids like quinine, morphine, and cocaine, are a few of the contributions with which chemistry has enriched medical practice. Even antiseptic surgery depends upon chemical preparations for its success.

The chemistry of agriculture is separately treated elsewhere, but a word may fairly be said upon the relations between chemical science and the arts. Every manufacturing industry is directly and profoundly affected by the results of chemical research. A century ago probably no manufacturing establishment in the world even thought of maintaining a chemical laboratory; to-day hundreds are in operation for the benefit of the intelligent manufacturer. Coal gas is a chemical product; its by-products are ammonia and coal-tar; and from the latter, as we have already seen, hundreds of useful substances, discovered within the last half century, are prepared. Better and cheaper soap and glass owe their existence to chemical improvements in the making of alkalies; chemical bleaching has replaced the slow action of sunlight and dew; chemical dyestuffs give our modern fabrics nearly all their hues. In metallurgy every metal is extracted from its ores by methods which rest on chemical foundations, and analyses of fuel, flux, and product go side by

side with the smelting. The cyanide and chlorination processes for gold, the Bessemer process for steel, are good examples of the advance in chemical metallurgy; but before they can be applied the dynamite of the miner, another chemical invention, must have done its work underground. Waste products are made useful, and new applications of old materials are discovered by the chemist; even curiosities like the rare mineral monazite are brought into play. Monazite furnishes the oxides of thorium and cerium, from which the mantles of the Welsbach burners are made. Every year brings its improvements, and chemical patents by the hundred are annually issued to inventors.

The facilities for chemical training have increased side by side with the demand for chemical services, and in every university or technical school chemistry has become a leading study. Even the preparatory schools are now equipped with chemical laboratories, and the science has come to be recognized as an important part of a liberal education. Apart from its practical bearings its disciplinary value is very great, and this consideration is now given due weight by teachers.

One more phase of chemical activity remains to be noticed, the organization of chemical societies. Of the larger national organizations the English society is the oldest, the French next, then comes the German, and then the American. The German society is the largest; but the American Chemical Society numbers over 2,200 members, and has sixteen local sections in continuous operation. In its journal it publishes over 1,500 octavo pages each year. There are also many smaller organizations devoted to chemistry, and some to special subdivisions of it, such as electrochemistry. Applied science is represented by the Society for Chemical Industry, an Anglo-American association of great strength.

Bibliography.— Clarke and Dennis, 'Elementary Chemistry' (1902); Classen, 'Quantitative Analysis' (1902); Crookes, 'Select Methods in Chemical Analysis'; Jones, 'Elements of Physical Chemistry' (1902); Lüpke, 'The Elements of Electro-Chemistry'; Mendeleéf, 'The Principles of Chemistry'; Muir, 'The Elements of Thermal Chemistry'; v. Meyer, 'History of Chemistry'; Remsen, 'Organic Chemistry' and 'Inorganic Chemistry, Advanced Course; Roscoe and Schorlemmer, 'Treatise on Chemistry'; Thorpe, 'Dictionary of Applied Chemistry' (3 vols.); Tilden, 'Short History of Scientific Chemistry'; Walker, 'Introduction to Physical Chemistry'; Watts, 'Dictionary of Chemistry' (4 vols.).

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Chemistry in Human Progress. Running over some of the great chemical developments to find a starting point, agriculture appears to be a good field to begin in. As agriculture is the oldest industry on the face of the earth, it is not strange that many facts should have been discovered during the centuries of its practice. But, before chemistry was developed, there could be no science of agriculture. What was known was purely empirical, and no reason could be assigned for the result. Many may be surprised to know that scientific agriculture dates from 1862, 39 years ago, the date of the publication of Liebig's great work on 'The Chemical Process of Vegetable Nutrition and the Laws of Agriculture.' Liebig's first work appeared in 1840, and was met with a storm of abuse and criticism. But then the world usually treats a new idea in that way. Abuse by the world often means that one has evolved an idea having some claim to originality. It seemed particularly to vex the public that a chemist should meddle with agriculture, and dare to assail the views of practical farmers. The book went through many editions and then dropped out of notice, for, although founded on correct principles, Liebig had erred in his inferences, and his ideas when put into practice failed entirely. Liebig stated that the plant lived on, or assimilated, the simple or inorganic constituents of the soil and converted them into complicated organic substances such as cellulose, sugar, albumen, etc., and that the animals lived on the plant; that the plant built up complicated substances out of simple ones, and that the animal consumed these complex substances, and then converted them back into simple substances. In other words, the plant was a synthetic organism, and the animal an analytic. To establish this, and to found upon it a practical method of agriculture and physiology, was a work so colossal that it is no wonder that even the mighty intellect of Liebig should have failed at first to grasp all of the details. Liebig examined an immense number of plants from all parts of the world, and found that while the plants all contained the same ash constituents, different kinds contained different proportions of these mineral ingredients; even different parts of the same plant, as the leaves, the stalks or the seeds, contained varying relations of ash constituents. As a result, Liebig was able to state that every plant takes from the soil a certain amount of mineral substances as a definite mixture, and that these substances will be found again in the ash, and that the carbonic acid and ammonia which the plant requires to form its combustible parts are taken up through its leaves and roots from the atmosphere. If wheat, or corn, is grown on a field, year after year, in time the mineral food of the soil will become exhausted and the plants will not thrive, but will be dwarfed and puny and incapable of enduring the weather, or will die of starvation. Now, if the proper amount of mineral nutriment be added to the soil, the plants will grow, and the atmosphere and mechanical nature of the soil will look after the rest.

A factory was established to manufacture artificial fertilizers according to Liebig's idea, but after several years of trial it was found that they were a complete failure. Liebig knew that his theory was right, but was unable to explain why it failed in practice. He worked and thought, and thought and worked. After several years he noticed that certain fields which he had treated with his fertilizers, and which had not been bettered by them, began to show slight but marked and increasing signs of fertility. In the meantime, the English farmer, Lawes, working with a chemist named Gilbert, showed that fertilizers would produce effects if added in a soluble form, and further that ammonia and forms of nitrogen were not taken

up by the plants from the air alone, but that they must be added to the soil. If these conditions were followed, the yield of a field was enormously increased. Liebig had supposed that if his fertilizers were easily soluble in water they would soak through the earth before the plant could assimilate them, and had hence made them as difficultly soluble in water as he could. But Thompson and Way long ago proved that surface soil had the power to retain certain substances when in solution. The scales fell from Liebig's eyes. The mineral food of the plant must be placed on the soil in soluble form; the soil would hold it and the roots would absorb it. In 1862 appeared the new edition of his great work, and agriculture became a science. It was easy to find out what was the proper food of any plant, and no farm need suffer from exhaustion. Since then the progress in this branch of science has been so rapid that it is hard to follow it. The striking facts of this discovery have been merely touched upon; there are many minor ones, and the conditions necessary for the successful application of the results are numerous, but every day shows advance in our ability to understand and apply them.

What are the effects of this discovery upon civilization? We find that agriculture as a livelihood, indeed, as a profession, has enormously increased. The vast deposits of fossil bones, phosphate rock, and of guano have been opened, and have developed a great industry, as well as have increased the resources of the world many fold. Stations have been established in many places for the examination of fertilizers and the determination of their value by chemical analysis, and employ a small army of trained chemists. The education and protection of the farmer have become a matter of national importance. Instead of farming land until it is used up, or relying on an empirical rotation of crops, the nutrients taken from the soil are systematically put back. Careful study of the chemical composition of a plant and the effect of chemical fertilizers enable us to develop certain products formed by the plant. Thus the beet root, by careful treatment, has been compelled to produce a far greater amount of sugar than formerly, and Germany has been freed from her dependence on other countries for her supply of sugar. Certain substances have been found to increase the specific functions of a plant, and so a plant can be developed into leaves, roots, stalk, or seed. In fact, we are getting to be more and more masters of the vegetable kingdom, or in other words, we can make two or even ten spears of grass grow where there was but one, and each will be bigger than the original one.

No man who has brains and muscle, and who is not afraid of work, need ever starve in this country, where land is so plentiful. Let us note one fact here, which is often overlooked. The great wave of agricultural development has swept over the West and is rolling toward the Pacific. These pioneers skim the cream. When the soil gets exhausted they move on to new ground. This is not an entirely beneficial production. We are sending, it is true, vast amounts of grain and foodstuffs to Europe, and money is coming back, but in what proportion? The mineral ingredients of these breadstuffs are lost to us, and soon we shall have to replace them, which will cost us more, perhaps, than we have received. In 1883 we exported:

Of wheat	$120,000,000
Of corn	28,700,000
In all	$148,700,000

The cost of production of this was $60,400,000, so that one might think that there was a profit of $88,300,000.

According to Prof. Voorhees, of the New Jersey Experiment Station, however, there were in this exported wheat and corn 70,000 tons of nitrogen, 40,000 tons of phosphoric acid, and 21,000 tons of potash, which are worth, at market rates, $33,000,000. Hence our real profit is only $55,300,000, and a corresponding decrease in the capital stock of the West. This amount in time must be replaced, or our soil will become exhausted. So long as we can draw on our native supplies, well and good, but the time may come when we may have to buy them back, and at an advanced price.

In a word, then, Liebig's great discovery has done much to develop the prosperity and independence of nations, for the independence of a nation will be based largely on how well it can feed its inhabitants, that is, its power of endurance. No better result of the wonders that scientific agriculture can accomplish may be seen than in the States of Connecticut and New Jersey. Look at the thousands of acres reclaimed from stone and sterility and now yielding bountiful crops under scientific treatment. Nor forget what honor is due to the men who, by dint of sheer persistence, grit and brains, introduced Liebig's work into this country, and who have educated the plain agricultural workers to such an extent that these States can compete with others better adapted by nature for agricultural production, who established the first agricultural stations, after which all of our others have been modeled, and to whom not only these States but our whole country owes a debt of millions of dollars, if prosperity can be repaid in cash. I mean Prof. Samuel W. Johnson, of New Haven, and Prof. George H. Cook, of New Brunswick.

Let us now look into the subject of live-stock and see what chemistry has done there. Lavoisier had shown that animal warmth was due to processes of oxidation, a kind of burning of the carbonaceous and hydrogenous substances in the body, just as the heat of burning wood is caused by the oxidation of the carbon, its chemical union with oxygen. Dulong and Despretz proved that nine tenths of the heat produced in the body was owing to this cause. The heat of our bodies appears to be a kind of flameless fire. Bodily heat is very much like steam heat, and to produce it fuel must be constantly kept burning under what may be termed the boilers of our organisms.

In the subject of animal nutrition the mighty mind of Liebig again found a vast field to till. In many ways this was no new and untrodden ground. Physiologists had accumulated hundreds of interesting facts, but the great question, how is it that although the nutrition of the various animals is so different, the composition of their bodies is so nearly the same, had not been answered. The flesh of the ox, the bird, and the man is about the same thing. The

change of substance in a hungry herbivorous animal is about the same as in a carnivorous one. From the day of Hippocrates to 1840, this question had been becoming more clearly defined, but the answers to it were conflicting and unsatisfactory. Suddenly, like a flash of lightning, the darkness was dispelled. The essential facts had all been found, but a chemist was needed to translate and explain them. It was like the old story of the writing on the wall. It was there, but no one could read it. It would take me too far from my subject to attempt to explain the details of Liebig's views of physiological chemistry, to relate the fierce polemic wars waged on these questions; for the dictum of Ranke is as true in the history of science as in the history of nations: "All progress is through conflict." Suffice it to say that Liebig was the first to definitely assert that the animal must find the chief constituents of its blood, which form and nourish its whole body, ready formed in its food, and these substances originate and are found in the plants. Following this up, we find that the animal is a kind of chemical factory in which many chemical processes are carried out. The machinery belongs to physiology; the processes, however, are largely chemical.

Chemical statistics in relation to animal life were collated and increased. Animals were analyzed wholesale, and their chemical composition determined. For instance, Lawes and Gilbert found that the analysis of 348 whole sheep gave an average of 2.34 per cent of ash, 7.13 per cent of protein, 70.4 per cent of fat, and 20.1 per cent of water. All kinds of animals were examined, and the composition of entire specimens and of the various organs and fluids determined. Foods were examined chemically, and, in fact, not only the body of the animal, but all that went into it and came out of it was analyzed by the chemists. The result of all this was that chemists found the animal to be as susceptible of experiment as the plant. Live stock can now be fed, for instance, to make flesh, to make fat, to yield milk, to produce work, or to simply maintain life. The nutritive elements of food can be determined and their digestibility estimated. The economy of foods can be calculated, and, in fact, the whole subject of animal-raising has passed from empirical management to scientific organization, and in this field, too, the progress has been rapid, and is still wonderfully rapid.

The animal is now studied very much like a steam engine; in the one case we feed coal and get steam, power, or heat, in the other, we feed fodder and get milk, flesh, or power, as the case may be. A "ration" can now be made in which the digestible proteine, the fat and carbohydrates can be obtained from the most various sources, and the fluctuations of the markets taken advantage of to produce the raw materials. The nutritive value and digestibility are carefully adjusted, and, as a result, for instance, we are able to produce milk at a total expense of 2½ cents a quart. In this country the science of live-stock feeding is as yet in its infancy. We are, at least in the West, gathering the bloom of the land. Our cheap beef and our cheap corn can be produced only for a time. Sooner or later the riches taken from the soil must be put back again. It would be hard, indeed, to trace all the effects of these discoveries on the gradual progress of civilization. Cheaper food and more economical and profitable agriculture strengthen the great tap-root of all civilization and human relations on this earth.

As a result of all this great advance in our knowledge of scientific agriculture farming has become a profitable profession, and I predict that more and more we shall see educated young men entering it.

The chemical study of foods has been carried up to the feeding of men. Prof. Atwater, of Wesleyan College, has published the results of his investigation on the cost of supporting workmen, and finds that the amount of food necessary to support a man and enable him to do his daily work, can be obtained at a cost of 12 cents a day. For 45 cents a man can live sumptuously. When meals are provided for a number at once the cost is ridiculously small. It might be well for some of the knights of labor and serfs of capital to look into these matters. What a frightful waste there must be in our household economy of to-day.

What a future looms up in this field of study. Think of the suffering and want that this accurate chemical work will alleviate when it is understood and appreciated. The German government supplies the people in certain districts with plainly written tracts explaining what are the most valuable nutriments in foods and about what amount of each is needed to make a daily ration which shall neither want nor waste valuable substance. Our own government is doing the same. Chemical knowledge gives an enormous increase in the purchasing power of a country, and greatly ameliorates the environment by making it more favorable to the people.

In the days of old, people supposed that every object was a particular kind of matter. It is true that Aristotle believed in four elements, earth, air, fire, and water, but these were used largely in a figurative sense. Wood was a substance, so was coal, so was water, so was air. They were supposed to be different kinds of matter. As chemistry began to develop, during the last 100 years, it was found that all the different kinds of matter about us could be resolved into a certain number of simpler substances, and that these simple substances could not be further altered. They were hence called elements. So far, about 75 of these elements have been found. All of the material objects about us are compounds of these elements; some, of course, being very common, and others more or less rare. Oxygen, for instance, a colorless gas, but when in combination, giving rise to compounds of the most various properties, constituting one half of the earth's crust, nearly one quarter of the air, and about one half of clay, sand and limestone. At first, methods of ascertaining the percentage composition of substances were very crude, but during the last 50 years they have, by means of the exquisite delicacy of the chemical balance and our increased knowledge of the chemical behavior of substances, been brought to a very satisfactory state of exactness. A student can now analyze with ease substances that would have perplexed the professor of 50 years ago. Aside from the immense advance in our knowledge of chemical causes and effects made by this powerful lever placed at our disposal, the public has been afforded a most marked protection

against fraud and imposition. No matter how high-sounding and laudatory the announcement of certain articles may appear, the cold-blooded analysis of the chemist at once dispels the illusion. There is no lack of unscrupulous persons who take advantage of many a chemical discovery to fill their own pockets at the expense of the public. The extent to which adulteration is carried to-day cannot be conceived of by one who is not conversant with the results of the analysis of commercial articles. Indeed, the popular ignorance on this subject is astounding. The continual demand by the public for cheap articles drives the manufacturers to all sorts of ways and means to adulterate. To counteract this, boards of health are continually analyzing articles of food. But commercial articles, however, are, as a rule, examined only by those who know how a chemical analysis can protect the buyer. Some years ago New York paid $10,000 a day for the water added to the milk sold in that city. In every city one will find many articles of daily use are systematically adulterated. The time will come when every city will have to have its board of public analysts, who shall analyze all articles free of charge. Such boards now exist in France and Germany, and the results of their work throws a sombre light on the strivings of human cupidity. Cream of tartar often contains as high as 80 per cent of adulteration, illuminating oils are not seldom about as safe as gunpowder, soaps may be one-half water, borax is sometimes mostly baking soda. In the matter of fertilizers, the State experiment stations examine free of charge all articles, and determine their true value, but hundreds of other articles should also be tested by the government that the public may be protected. Slowly but surely the keen weapon of chemical analysis is lopping off all these unsightly side-shoots of our civilization. As long as food and drink consist of chemical substances and so many of the articles bought and sold are chemical compounds, it should be known to what extent they are what they are claimed to be.

What is the effect of the increasing accuracy in chemical analysis upon our civilization? It places every article on its true basis of intrinsic worth. Metals, ores and articles of commerce, have a certain value depending on the nature and amount of their valuable constituents. This is determined by analysis, and business is at once placed upon a solid foundation, and insecurity in values ceases. Chemical analysis is the balance wheel of trade. It establishes responsibility. It says to the cheat, honored and respected though he may be in the community — and there are thousands of them — "Thou art the man." It compels accuracy of statement — rigid truth. There is no effervescent sentiment in a chemical analysis. It makes honesty compulsory. Articles of food and drink must be what they claim to be, no more, or less. A man who adulterates is a liar and a thief, if not also a coward. He may cause ruin, disaster and death. A man who buys adulterated articles is a fool. Chemical analysis is one of the greatest agents for the protection of a community that there is, and its power is increasing every day. Again note: Chemical analysis shows clearly which of several articles are the best. Then we buy the article that we know to be the best. And so chemical analysis, disclosing to the world where true worth is to be found, develops countries and gives them resources which may enable them to compete with greater nations. It shows us the relations between the material objects about us, and our own relations to them. For instance, the atmosphere, which is necessary to our existence, is composed of ogygen and nitrogen. The oxygen is being continually consumed and appears again as carbonic acid, the results of fires, fermentation and the respiration of animals. The plants consume the carbonic acid and give back the oxygen again to a great extent. There are thousands of these agents at work to change the composition of the air. And yet its composition does not practically vary. Should it, however, then life would feel the change at once. An increase of the percentage of oxygen in the air we breathe would produce a marked effect upon us. It is wonderful that the balance of these conditions is kept in such equilibrium on such a scale.

And still again, chemical analysis showing how all the objects about us are composed of but a few different kinds of matter, how, indeed, we ourselves consist of little more than a dozen elementary forms of matter, compels us to gape in bewilderment at the evolution of a universe, with its endless variety of detail, out of less than a hundred different kinds of matter.

For a number of years chemists have been laboring to produce substances and study their properties. In this way a vast number of compounds have been produced, and the list is now yearly added to at a rate that makes one's head ache. The chemist interests himself chiefly with their chemical and physical properties, and as to their proper position in the particular classes to which they belong. Thousands and thousands of such substances have been created, or discovered, by the chemist, and but a very small number of them have as yet been applied. The study of their physiological properties will afford work for a legion of physiologists. Take ether and chloroform as instances. How hard it is to imagine a time when anæsthesia was unknown. Think of being unable to overcome pain! Of course the introduction of these agents met with opposition. Some said it was wrong to prevent pain, as others thought it a sin to use an umbrella because the rain was intended to wet us, or to insure one's life because it was flying in the face of Providence. But in time the clouds of ignorance were dispelled and the world came to know one of the greatest blessings that science has bestowed upon humanity. The pain and suffering that these agents have saved humanity is incalculable. Operations, which years ago would have been regarded as madness, are now, by their use, of common occurrence. There are thousands of substances whose physiological properties have not yet been tested. It may be that among all these substances we may find ones that will directly affect each function and organ in our bodies. Physicians have as yet but barely entered this field of physiological research; and unfortunately their labors are hampered in certain places by the attacks of the so-called Bestarians, who would not permit vivisection. Strange how little compunction these people seem to feel in allowing the results obtained by vivisection to be applied in the treatment of their own families when sick. The law of

atonement is nowhere more strikingly exhibited than in scientific research. If certain diseases are to be controlled, their causes discovered, and stamped out, cats and dogs may have to be sacrificed. We may wish all of our friends, all the babies and all of the cats and dogs to live, but like many other things we would like to have, we may have to suffer disappointment. Perhaps, after all, the fair sex is responsible to some extent for the destruction of animals. Think of what an indiscriminate slaughter of birds is continually going on that our fair friends may be able to carry fragments of the remains on their heads. Even if the tortures ascribed to vivisection existed, they would pale beside the horrors that follow the sportsman. The animals and birds dying in fevered agony of peritonitis and being eaten alive by ants and beetles are fully as heart rending as anything that has been ascribed to vivisection by the wildest imagination.

Look at the advance in our knowledge of the action of disinfectants. And here again, but an absurdly small number of the vast array of substances at our disposal have been tried. Many diseases are communicated by a kind of seeds, spores, or germs. If these seeds can be killed it is impossible for the disease to get a foothold. Just as when the seeds of a plant are killed they will not sprout. The following instance of what can be done in this direction is interesting.

Some years ago the whole city of Detroit was disinfected by Dr. Oscar W. Wight, health officer of that city. All the receiving basins, sewers, etc., were disinfected by copperas, and the atmosphere of the sewers was purified by hanging in the manholes iron pails filled with burning sulphur. In all, the amount of copperas used by officials and citizens was 280,000 pounds. The gaseous disinfection of the sewers requires about three tons of roll brimstone. The total expense for the complete disinfection of the sewers (75,000 pounds of copperas and 6,000 pounds of sulphur); was less than $1,300.

After the first disinfection of the city, there followed a great abatement of diphtheria, and an almost entire cessation of scarlet fever. The second experiment was followed by an almost complete cessation of diphtheria. Some years ago I kept the gutters of New Brunswick, N. J., disinfected with a solution of bromine, and obtained a marked improvement in them. These facts make one stop and ponder. If, then, instead of spending the money of a community in supporting inefficient officials, ward heelers and political quacks, a portion of it were expended in the systematic purification of the town, the death rate would be decreased; there would be fewer little graves to dig. But think of the astonishment of even a not unusually common council if asked to appropriate, several times a year, a sum of money to buy materials to throw into the sewers. Diphtheria, scarlet fever, and, for all we know, many other diseases, are the punishment of infractions of laws ordained for our benefit. Official cupidity, negligence and ignorance mean more than bankrupt towns, business depression, and loss of confidence. They mean broken hearts and bleak graves. The money received from political deals, or from the sale of a vote, is but poor recompense for the loss of a child. The increase in personal responsibility caused by the increase in scientific knowledge is a vast one. It will be the great lever of the future.

The time is fast coming when the good old-fashioned phrase "dispensation of Providence," as so often used, will have to be replaced by the more easily understood but less pleasant, although entirely synonymous words, "the effect of ignorance," or "the punishment of incapacity," or again "the result of neglect," or yet again, "the spew of dishonesty." In fact, the object lessons of nature are so plain that a philosopher might think them to have been especially designed for the intelligence of an average politician. Take, for instance, the cases at Plymouth. The discharges of a typhoid patient were thrown into a brook, and the brook ran into the reservoir of the town. Soon there were 2,000 cases of typhoid. About the same thing occurred in the village of Lausanne, Switzerland. Such are the object lessons of nature.

As chemical knowledge advances and chemists analyze minerals and the substances found in plants and animals, determining their relations and properties, classification of many compounds becomes possible. Many substances, exclusive of those found in animals, have been produced by the chemist. Thus ordinary salt is the same substance, whether extracted from seawater or produced by mixing muriatic acid and soda. But the substances found in animals, that is in organized objects, while they were analyzed and their composition accurately determined, were supposed to owe their formation to the action of some mysterious vital power, usually called "vital force." It was assumed, with really no other apparent reason than it had not yet been done, that it could not be possible to make an organic substance artificially. The animal by reason of its mysterious, inherent vital forces must do that.

There is a certain compound called urea which is formed in the animal system, and which in many ways is of extreme importance. It was described in 1773 by Rouelle, and determined in 1790 by Fourcroy and Vauquelin. In every way it was then considered as an organic substance par excellence. In 1828 the great master, Woehler, of Göttingen, made urea artificially by heating ammonium cyanate, and the vast field of organic chemistry was opened to investigators. In 1832 Liebig and Woehler published the results of their labors on benzoic acid and the oil of bitter almonds, letting in a flood of light upon the subject of chemical constitution. The great Berzelius in his excitement proposes to call the new radical "pröin," from *Proi,* the beginning of the day. Since this time, the truly marvelous structure of organic chemistry has grown at a rate unequaled in the history of the development of any science. I wish there were some way of explaining organic chemistry to the general reader, for it is a wonderfully interesting subject. We can appreciate its results although unable in all cases to follow the methods by which they are obtained.

There have been so many remarkable victories achieved in the field of organic chemistry that it is hard to decide which to mention. Prominent among them are aniline colors. A more uninviting substance than coal-tar is not often found, yet in the hands of the chemist it has yielded compounds which, by profound study and skilful manipulation, supply the world with colors surpassing in beauty anything

produced by nature. In a few years a great industry has sprung up, employing thousands of men and an enormous capital; and all this founded on a waste product which manufacturers were once at their wits' end to find means to dispose of.

And, then, to what an extent is the fair sex indebted to the humble chemist! We have given them the wonderful aniline colors, which would put Solomon in all his glory to shame, and compel the peacock to hide his head and his tail in bedazzled desuetude. We can make velvet out of cotton and sealskin out of silk. We can supply perfumes surpassing the distilled refinements of the spices of Araby. We can make artificial blushes, heart palpitations, inflated rubber bosoms, and alabaster complexions. We can make imitation feathers, or whole birds if necessary, as well as all kinds of floral and animal remnants for personal decoration. We can change raven locks to tresses of glinting gold, or *vice versa*. We can supply eyes of any shade of color, as well as any number or kind of teeth. In fact the chemist is to the girl of the epoch what the lamp was to Aladdin — only more so.

Indeed, many of our so-called necessities of life are of quite recent introduction. Sugar, for instance, as late as 150 A.D. was prescribed by Galen as a medicine, and in 1455 was still a rarity. In 1775 all England consumed only 20,000,000 pounds in the course of the year against 20,000,000 hundred weight in 1885. And now comes the new sweet substance, saccharine, which is so sweet that a pinch of it will sweeten a barrel of water.

It is strange to note what a power may be exerted by a chemist working in some small and but little known laboratory. Graebe and Liebermann undertook the study of alizarine, the coloring matter of madder, and soon found out its chemical nature, and were able to produce it artificially from a substance found in coal-tar. A manufacture was founded and madder growing is slowly but surely dying out. Lately Baeyer has untangled the complications of indigo blue, and it is now but a matter of time when indigo growing will cease to be an industry. Salicylic acid, formerly a rare and costly product, has become an article of commerce, through the labors of Kolbe, who showed how it could be made cheaply from carbolic acid. And now a nation can send its armies out to battle in a region where rheumatic complaints would cripple them and leave them helpless at the mercy of their foes, had they not this power at their control to subdue these diseases. It is true, the diplomat utilizes to their full worth the powers at his disposal, but it must not be overlooked that the chemist furnishes him with many of his most efficacious agents.

I could go on with a long list of triumphs in organic chemistry and show how much we are indebted to the labors of certain diligent investigators in this field. In the matter of the processes of digestion our knowledge of organic chemistry has enabled us to make important progress in the last years. We are now able to produce many new and valuable forms of food, especially for children and invalids. Thousands of lives are saved every day by the use of chemical foods, and the application of chemical discoveries.

Let us glance for a moment at iron and steel. If iron contains even very small amounts of certain substances, as phosphorus, for instance, it has but little value, for its properties are injured. Within a few years a young English chemist after patient experiments discovered a method by which the phosphorus could be easily removed from iron. This appears to be a simple matter, yet how much it means. Immense deposits of iron ore which could not be used because they contained phosphorus became at once of value. The material wealth of the country was immensely increased. The uses of iron and the simplicity of its production were increased. It has been well said that this untitled, almost unknown young man (Walter Weldon, q.v.), has done as much or more for England than all her kings, queens, and aristocracy put together have accomplished for her.

And again, now that we are coming to live in an age of steel, note that steel is a chemical industry. To make steel, we must decarbonize iron to a certain point, and to do this economically Bessemer introduced a method which revolutionized the whole industry. Can any one tell what the debt of the world is to cheap steel? Any one who will bear it in mind will find himself giving hundreds of answers to it. Try to trace out for how many of what are called the necessities of daily life we are indebted to cheap steel, and one cannot but be surprised.

The subject of the metals in general is worth attention. Chemistry has brought our means of extracting them from their ores and their subsequent refinement to a remarkable degree of perfection. We have numerous alloys which are of daily service, as phosphorus-bronze, friction-metal, gun-metal, and a thousand other useful inventions, all tending to cheapen articles and, indeed, in many cases to beautify common objects. Compare the doorknobs and hinges tastefully made of bronze with the common ones in use only 20 years ago. This all means the art education of the people, and we must never underestimate the power of this. And now we have cheap aluminum. It looks as if this may be the metal of the future. Brilliant, wonderful in its many properties, and more remarkable still in the fact that every clay-bed is a mine of it. How irritating this has been to chemists for years can well be imagined. Incalculable stores of this beautiful metal all about us and no means to extract it. If aluminum can be modified as iron now is, and given the properties akin to wrought iron and steel, then the future will be the age of aluminum.

If one were to ask how the state of civilization of a country should be judged one would probably be told how many churches there were, attention would be drawn to the volume of business done, the fine hospitals, the excellence of the police, the commodious jail, the tax rate and many other prominent features of the place. The chemist, however, would simply determine the amount of sulphuric acid used, directly or indirectly. In other words, almost all of the articles we use involve either directly or indirectly in their manufacture the use of sulphuric acid. This manufacture is carried on a scale so vast that a fair idea can hardly be given of it. Every detail has been studied and studied by scores of chemists. Each reduction in the cost of making it has cheapened thousands of articles. In the manufacture of bleaching powder

there was once a great waste. The acute mind of Walter Weldon turned this loss into a source of profit and the price of chloride of lime was reduced. Every time that we buy a piece of white paper and admire its whiteness and cheapness, we must remember that we are indebted to Walter Weldon.

Indeed, in the matter of paper, note how striking has been the progress. Cheap paper means cheap books, cheap newspapers, cheap knowledge, education of the public. Good paper means preserved eyesight. I need not say that paper is really a chemical manufacture. But little progress would be made in turning wood into paper without the chemist. And note again the future of paper. We have paper car wheels, paper gas pipes, paper water pipes, paper pails, paper stoves, paper chimneys, paper boats, paper forts, etc., etc.

One of the very important results of the study of chemistry has been the gradual change of empirical and wasteful processes of manufacture into rational and profitable methods. Every year shows progress in increasing the yields of manufactured products, and also increase in purity. Wastes are utilized, manufacturing costs are decreased, labor is made more efficient, trade expands and profits increase.

In 1739 Dr. Clayton, dean of Kildare, first distilled coal. But it was the end of the century before gas was practically introduced as an illuminating agent. Imagine one's sensation on first being asked to put a network of piping into one's house to convey a combustible and poisonous gas. The joints might not be tight, the cocks might leak; we might be poisoned by the thoughtlessness of any one who might not shut them off, or, indeed, the house might be blown to bits should the gas escape and ignite after it had become mixed with air. Yet it does not worry us now, even though all these things do come to pass not infrequently. From Dr. Clayton's experiments has arisen a vast industry with complicated side branches. Gas, coke, colors, medicines, disinfectants, delicate flavoring essences and a host of other inventions have followed in a steady stream. There has been no end to the discoveries in this field. In Europe gas has become almost a waste product, so valuable have its by-products become.

The invention of artificial light has extended the available term of man's life; by giving the night to his use it has, by the social intercourse it encourages, polished his manners and refined his tastes, perhaps as much as anything has aided in his intellectual progress.

It is very interesting to trace the development of many manufactures, as for instance the introduction and perfection of glass-making, which allows us to avail ourselves of the best medicine there is, sunshine. What a world of happiness lies in that word "sunshine!" Disease germs are paralyzed by it. Plenty of it prevents dark deeds. If we ever feel like being thankful, let us remember the abundance of windows in our houses, and that our little ones can play in the sunshine, and that we can have sunshine in our houses free of cost and without tax. How little one realizes the convenience in the use of glass and china articles. That hard, smooth surface which can be so readily cleansed, and which makes our tables so attractive and our food so palatable. We shall find that much of our pleasure, and, indeed, a good deal of our health, is dependent on glass and porcelain. The chemist has done hard work for us on these articles, for there have been many neat chemical problems involved. We can now give glass some valuable properties. We make wool of it, spin it into yarn and weave wonderful dresses of it; make wigs of it, cover steam pipes and fill floors with it, make railroad sleepers out of it. Perhaps, in time, we shall be able to turn it on a lathe, or even to live in a glass house without fear. Who knows? Does not the illustrious Hofmann say, "With the gods and the chemist all things are possible"?

There are many interesting applications of chemistry which have been forceful factors in the development of civilization. The manufacture of soap, for instance, the use of which has also been taken as an index of civilization, has been immensely improved by the labors of the chemist, and it would be easy to trace the beneficial effects of it on the health of a nation. It is true that we have not the public baths of the Romans, or places where all the poor may bathe, but we have the next best thing — cheap soap.

Then there are remarkable chemical improvements in the arts of dyeing and printing textiles, by which good clothing has been made accessible to the poorer classes. Cleanliness and good clothing are no small factors in civilization. There have been astonishing discoveries in the field of fermentation, the middle ground between biology and chemistry, from which our ideas about disease germs and ptomaine poisons have arisen, and due to which treatment of many diseases has been radically altered for the better. In fact, the whole of antiseptic surgery, which allows of operations never dreamed of in past years, has become not only possible but of daily occurrence. Thousands and thousands of useful lives have been saved by the application of these discoveries.

And so our increasing knowledge of the relations of things will enable us in time to prevent disease. The average death rate in our cities is far too high. The average duration of life is about ten years too short. There are over 100,000 unnecessary deaths every year in the United States. In time we shall see more of true death, Euthanasia, or old age. How well Richardson describes this: "Without pain, anger, or sorrow, the intellectual faculties of the fated man lose their brightness. Ambition ceases or sinks into desire for repose; ideas of time, of space, of duty, languidly pass away. To sleep and not to dream is the pressing, and step by step, and still pressing need, until at length it whiles nearly all the hours. The awakenings are shorter and shorter, painless, careless, happy awakenings to him of a busy world, to the merry sounds of children at play, to the sounds of voices offering aid, to the efforts of talking on simple topics and recalling events that have dwelt longest on the memory, and then again the overpowering sleep. Thus on and on, until at length the animal nature is lost; the intuitive and merely animal functions now no longer required to sustain the higher faculties, in their turn, succumb and fall into inertia. This is death by nature, and when mankind has learned the truth, when the time shall come — as come it will — that 'there shall be no more an infant of days, nor an old man who hath not filled his days,' this act of death

now, as a rule, so dreaded because so premature, shall, arriving only at its appointed hour, suggest no terror, inflict no agony."

Chemistry has even dared to make the study of life a matter of investigation. Dr. Oscar Loew has indicated that in live albumen there is an atomic complex known as the aldehyde group, and in dead albumen it is not present. A striking inference of this fact is that substances which are known to have an energetic action on the aldehyde group exert also an intensely poisonous action on living protoplasm, and certain substances have on this induction been examined and really found to be violent poisons. Could we reconstruct the aldehyde group in a dead protoplasm? And if so would the protoplasm again be alive? Who can say? It is a mysterious subject and the discoveries but make it more mysterious. But then it is darkest before daybreak.

Even such a little matter as a match represents quite a number of chemical phenomena and ingenious applications of chemical discoveries. It is curious to think of what added power has been given to man by his ability to make fire so easily. The idea of fire leads me to speak of explosives, for there are some very interesting facts to be derived from the study of this subject. If we had time to investigate the effects of gunpowder in history we should note some striking results. Ancient history is largely a history of war. Disputes were settled by force of arms — physical force. Rulers ruled by force. Blood flowed on slight provocation. Might, not right, was the rule. Weapons were of the crudest kind, and wars often lasted for years. Later on the ruling classes clad themselves in armor and then as McElroy has so well explained in his article on 'The Musket as a Social Force,' for many years the world was at the mercy of the 'Man on Horseback.' He was invulnerable in his armor, and with sword and spear tyrannized, brutalized and slaughtered as his humor struck him. The serfs fared badly in the early days. In the "war of the Jacquerie," in 1348, there was an exciting serf-hunt conducted in one of the French towns, and after three weeks over 20,000 miserable men were run to earth and killed. The man who could strike the heaviest blow was ruler in those days.

Then in the 14th century someone invented gunpowder, and then a queer sort of gun, a kind of two-inch gaspipe with a touchhole. This gun was fastened to a stick, which one man held, while a second applied the fire. The ball weighed a pound and traveled scarcely 200 feet, so weak was the powder. Crude as the whole contrivance was, and tedious as it was to fire off, it curled up the man on horseback in the dust and left him a waste product on the land. Those who had robbed the farmer of the fruits of his hard labors, now went to fertilize the crops, a most admirable adjustment of nature, even though it was somewhat belated. Soon gunpowder and the gun were improved, and by their aid the robbed man "re-clothed himself with the rights that had been torn from him by a thousand years of the despotism of the 'Man on Horseback!' »

During the last 50 years explosives have been brought to a high state of perfection. Chemistry has placed in the hands of men agents that are so powerful that they cannot be resisted. Trace the progress of a nation by the record of its conquests, and note how chemistry has given it, perhaps, the majority of its tools, its explosives, its system of feeding, its medicines, and so on through a long list. It will not be long before war will be impossible; in fact all conflicts impossible. The dynamite gun will blow a fort to dust, the submarine boat or the electric torpedo, guided by an unseen hand miles away, will send a ship into the clouds. The balloon, dropping explosives and inflammables, will wipe a city from the face of the earth as a child rubs a picture from the face of a slate. An explosive shell, filled with the proper chemicals, will poison a whole army. The prick of a needle, coated with virus, will sow incurable disease, and you may select from a catalogue nauseatingly long. A gill of typhoid germs dropped into the water reservoir of an ordinary town will leave few to tell of the horrors that followed. War will in time mean simply extermination of both parties. Pure arbitration, intellectual investigation of the question, the discovery of the principles and laws involved in the matter, and careful adjustment must come in time. Oppression, tyranny, and bossism are to pass away. Knowledge is the possession of humanity, not of the rich alone, or of the powerful, but it is to be the birthright of the citizen. An irresistible power has been placed in the hands of the oppressed. First we have the slave, then the serf, now it is the wage-worker, the laborer. The capitalist has money, the laborer has dynamite. It is about as hard to know what to do with one as with the other. Neither can ever rule, and this phase, like the preceding ones, will slowly pass away. Any attempt to control others selfishly and wrongfully will be defeated by the irresistible power of knowledge of right.

Look abroad and notice how much nations take from each other without fighting. They slap each other's face and call each other bad names, but they don't fight. It is true that they support immense armies and armaments, but the time is coming when these armaments will cost so much for their support that to avoid bankruptcy they must be given up. The swords must be turned into plowshares and the men must go to work to aid in supporting instead of being supported by others. A peace of nations, a bankruptcy of nations, or an extermination of nations are the three alternatives to-day for Europe. So much Bismarck saw.

Force being neutralized, the conflict is to be one of intellect, reasoning based on an exact knowledge of facts. Physical force is already at a considerable discount. Educated brains are the important factors of success to-day.

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Chem'itype, a term used in engraving to include various relief processes by which a drawing or impression from an engraved plate may be produced in relief to fit it for printing on an ordinary printing press.

Chemnitz, kĕm'nĭts, or **Kemnitz, Martin,** German Protestant theologian: b. Treuenbrietzen, Brandenburg, 9 Nov. 1522; d. Brunswick 8 April 1586. He was the son of poor parents; received his education at Magdeburg and Frankfort on the Oder, and in 1544, to obtain the means of continuing his studies at Wittenberg,

became a schoolmaster in Wriezen. In 1550 he became librarian to Duke Albert of Prussia. He then wrote his 'Loci Theologici,' a valuable commentary on Melanchthon's system of dogmatics. Being invited to Brunswick, as minister, he attacked the Jesuits in his 'Theologiæ Jesuitarum Præcipua Capita' (1562), and, when the Council of Trent thought itself assailed in this work, he wrote his 'Examen Concilii Tridentini,' a work of great historical value. He gradually became attached to the Lutheran doctrines as distinguished from those of Melanchthon.

Chemnitz, Saxony, a town at the base of the Ezrgebirge, and at the confluence of the Chemnitz River with three other streams, 51 miles south-southeast of Leipsic. It is the principal manufacturing town of the kingdom — the "Saxon Manchester" its townsfolk call it — its industry consisting in weaving cottons, woolens, and silks, and in printing calicoes, chiefly for German consumption. It supplies the world with cheap hosiery, and makes mixed fabrics of wool, cotton, and jute for the markets of Europe and the United States. It has several extensive machine-factories, producing locomotives and other steam-engines, with machinery for flax and wool spinning, weaving, and mining industry. Created a free imperial city as early as 1125, Chemnitz suffered much during the Thirty Years' war. Pop (1900) 206,584.

Chemnitzia, kĕm-nĭt'sē-a (named after Chemnitz, a distinguished conchologist of Nuremberg), a genus of gasteropodous mollusks, family *Pyramidellidæ.* The shell, which is slender, is many-whorled with a simple aperture closed by a horny subspiral operculum. The animal has a very short head, with a long proboscis. Recent species 32; fossil 240, from the Silurian Period onward.

Chemosh, kē'mŏsh, the national god of the Moabites, who were on that account called "the people of Chemosh" (Num. xxi. 29; Jer. xlviii. 46). In Judg. xi. 24 Chemosh is mentioned as the god of the Ammonites, but the whole narrative here applies to Moab, and not to Ammon. Milcom was the national deity of the Ammonites. The Moabite Stone was erected to commemorate victories achieved by the aid of Chemosh. In the inscription upon it Ashtar-Chemosh is mentioned, apparently a goddess associated with Chemosh. Human sacrifices seem to have been occasionally offered up to Chemosh (2 Kings iii. 26, 27). The worship of Chemosh was introduced among the Hebrews by Solomon, who "built an high place for Chemosh, the abomination of Moab, in the hill that is before Jerusalem" (1 Kings xi. 7). Some have identified Chemosh with the sun, others with Saturn, while still others have regarded him as a war-god.

Chemotropism, kē-mŏt'rō-pĭsm, orientation (q.v.) by diffusing molecules, as where animals are attracted to their food by the sense of smell. Odoriferous particles are diffused or radiate from a centre; chemotropism is thus analogous to heliotropism (q.v.). The chemical effects of the diffusing molecules on certain elements of the skin, says Loeb, influence the tension of the muscles, just as the rays of light influence the tension of the muscles on heliotropic animals. Thus maggots of flies are positively chemotropic toward certain chemical substances which are formed, for instance, in decaying meat and cheese. The blow-fly (q.v.) has the same positive chemotropism for these substances as its larva, and is accordingly led to the meat. This explains the instinct of the blow-fly and similar insects, which compels them to lay their eggs on the food appropriate for their young, neither experience nor will playing any part in their processes. Consult: Loeb, 'Comparative Physiology of the Brain and Comparative Psychology.'

Chemulpo, chĕ-mŭl'pō, Corea, a town on the western coast, 25 miles by road west-southwest of the capital, Seoul. It is one of the three treaty ports opened in 1883 to foreign commerce, the volume of which has since steadily advanced, in spite of the drawbacks resulting from the great difference between high and low water here (33 feet), and the want of wharves. The imports attain a value of $3,500,000 in some years; the exports, $1,500,000. The chief imports are cotton and woolen goods, railway machinery, metals, oils, and timber; the chief exports are rice, beans, millet, ginseng, and cowhides. The majority of the 3,000 foreigners are Japanese. Small steamers owned by Japanese run to Seoul in summer, and Chemulpo is connected by telegraph both with China and Japan.

Chemung, shē-mŭng', **Battle of the,** in the Revolution, 29 Aug. 1779, the decisive engagement of Sullivan's campaign (q.v.), to harry the Iroquois country. The Indians and their Tory allies made a stand in force at the Chemung River, about a mile southeast of Newtown (Elmira), N. Y. They had five companies of British troops and rangers, numbering about 250; and the entire fighting strength of the Six Nations. These Indians the Tory authorities state as 550; but this seems impossibly small, and Sullivan and his officers, from a careful estimate of various factors, place it at 1,200 or 1,300. Sullivan had about 5,000. The Indians were led by their Napoleon, Brant (Thayendanegea); the Tories by Col. John Butler, with Sir John Johnson, and perhaps Guy Johnson, Major Walter N. Butler, and Capt. MacDonald. Their line was in advance of the river, resting on a bend at the right. From the bend ran a breastwork half a mile long, flanked by bastions and having a dwelling in front turned into a blockhouse; it was concealed by a mass of pines and scrub-oaks, some of them cut from other places and stuck down to make a seemingly thick virgin forest. From their left a thin line was continued about a mile and a half to a steep ridge parallel to the river, where a strong detachment was posted; and a mile further east was another ridge parallel to the first, with a breastwork and another company, the two advance detachments designed to take the Americans in flank and rear. Along the front of the main breastwork ran the road to Newtown, exposing the whole American flank to a raking fire. The entire works formed a magnificent ambuscade; but Sullivan, who was no Braddock, guessed the utility of the ridges, and knew what scouting parties were for. About 11 A.M. of the 29th Major Poor beat up the position; and Gen. Hand formed his infantry in a wood 400 yards from the works and waited for the rest of the army. Sullivan ordered Poor to carry the hill at his right and take the British in rear, while the main body with artillery attacked the front.

Steadied by Brant, a warrior of great force and sagacity, the Indians not only made a stubborn resistance for two hours, yielding inch by inch, but even stood up against the bayonet, something almost unknown in Indian history. At first thrown into a panic by the artillery, Brant rallied them to a fresh and tenacious fight; and noting Poor's turning movement, threw a strong detachment with a battalion of rangers to the hill to oppose it. But at length Poor, having cleared the crest, burst on the rear with a bayonet charge; and both Indians and whites fled across the river in rout, the Indians leaving their packs and weapons behind, and eleven dead, though they usually carry all these away with them. Fourteen other dead Indians were in fact found under the leaves, two canoes were found covered with blood, and the Indians told their western villages that they had many killed and vast numbers wounded. The Americans had six killed and 40 or 50 wounded.

Chemung Series, in American geology, the great series of shoal-water sediments, mostly light gray shales and ripple-marked sandstones, that were laid down in Upper Devonian time in the great northeastern bay of the interior sea that covered much of what is now the Mississippi valley. This northeastern bay stretched across lower Michigan, Ontario, and central New York, reaching nearly to the Hudson River. The Chemung Series includes the Catskill Group and is divided into the Chemung and Portage Stages. It is typically developed on the Chemung River in New York. It reaches its maximum thickness of 8,000 feet in eastern Pennsylvania, but thins out and disappears to the south and west. The "oil sands" of Pennsylvania from which have been taken many millions of barrels of petroleum, are of Chemung age.

The Chemung corresponds to part of the series of shales and limestones laid down in the Northwest Territory and Manitoba, Canada, probably to part of the Devonian strata that extend along the main range of the Rocky Mountains in Canada and to an unknown fraction of the great thickness of Devonian strata in Nevada. In Europe the Old Red Sandstone, a series of sandstones and shales estimated as possibly 10,000 feet thick, is in many respects like the Catskill group of the Chemung, and contains similar fossils. This great sandstone formation is found in South Wales, England, and Scotland, near the Baltic Sea in Russia, in Spitzbergen, and in Greenland.

The characteristic fossils of the Chemung Series in New York and Pennsylvania include, among land plants, tree-fern (*Caulopteris*), and lepidodendrons. The fauna includes, among mollusks, brachiopods and lamellibranchs in great number and variety, no less than 252 species of lamellibranchs having been described from New York. Gasteropods are rare. Of vertebrates the Chemung contains remains of *Pterichthys* and other ancestors of the true fishes, including *Cocosteus.* The *Dipnoi,* or lung-fishes, a connecting link between fishes and amphibions, are represented by species of large size (*Dinicthys*). Of selachians or sharks, but few remains are found. See CATSKILL GROUP; DEVONIAN SYSTEM; OLD RED SANDSTONE.

Chenab, chē-nŏb′, in Hindustan, one of the five rivers of the Punjab. It rises in the Himalayan ranges of Cashmere, and entering the Punjab near Sialkot, flows in a southwestern direction till it unites with the Jhelum; length about 800 miles. At Wazirabad it is crossed by a great iron railway bridge more than a mile long.

Chenavard, Paul Joseph, pōl zhō-zĕf chā-na-vär′, French historical painter: b. Lyons 9 Dec. 1808; d. 12 April 1895. He studied some years in Italy, and acquired a reputation by his picture of 'Mirabeau Replying to the Marquis de Dreux-Brezé.' After the revolution of 1848 he received a commission to paint large compositions for the decoration of the Pantheon. Among these are 'The Deluge' and 'The Passage of the Rubicon.' The Pantheon having been restored to the Roman Catholic worship, he was not permitted to finish the task.

Che'nery, Thomas, English journalist and Orientalist: b. Barbadoes 1826; d. 11 Feb. 1884. He was educated at Eton and Cambridge. He was called to the bar, but was soon after sent out as *Times* correspondent to Constantinople, where he remained during the Crimean war. Afterward he was constantly employed on the *Times* staff until 1877, when he became its editor, a post which he filled till within 10 days of his death. As a singularly thorough Hebrew and Arabic scholar he had few equals among his contemporaries, and his translation of the Arabic classic, the 'Assemblies of Al Hariri' (1867), led to his appointment to a chair of Arabic at Oxford in 1868. He was one of the company of Old Testament revisers, and besides other works published an edition of the 'Machberoth Ithiel' (1872), a Hebrew version of the 'Assemblies.'

Che'ney, Charles Edward, American clergyman: b. Canandaigua, N. Y., 12 Feb. 1836. He was graduated at Hobart College in 1857, and, after a course at the Theological Seminary of Virginia, was ordained a clergyman of the Protestant Episcopal Church in 1858. Becoming rector of Christ Church, Chicago, he incurred censure for heterodoxy and was tried on that charge and deposed from the priesthood. He at once became a leader in the Reformed Episcopal movement, and was consecrated bishop of the new denomination in 1873, a post he has since held, as well as the rectorship of Christ Church.

Cheney, Ednah Dow (LITTLEHALE), American writer: b. Boston 1824. She was married to Seth Wells Cheney (q.v.) in 1853. She has been president of the New England Woman's Club and the Massachusetts Suffrage Association. She has written 'Handbook of American History for Colored People' (1866); 'Gleanings in the Field of Art' (1881); 'Life of Louisa M. Alcott' (1889); and several stories, including 'Nora's Return,' a sequel to Ibsen's 'A Doll's House'; 'Sally Williams, the Mountain Girl' (1872); etc.

Cheney, John Vance, American poet and essayist: b. Groveland, N. Y., 29 Dec. 1848. He was librarian of the public library at San Francisco, 1887–94, and of the Newberry Library, Chicago, from 1894. He has published 'The Old Doctor' (1885); 'Thistle-Drift,' poems (1887); 'Wood Blooms' (1888); 'The Golden Guess,' a volume of essays (1893); 'That Dome in Air,' essays (1895); 'Queen Helen' (1895); 'Out of the Silence' (1897).

Cheney, Seth Wells, American engraver: b. South Manchester, Conn., 26 Nov. 1810; d. there 10 Sept. 1856. Upon the death of his father in 1829 he joined his brother John in Boston, where he entered the latter's profession, that of an engraver. A position in the Athenæum enabled him to study and work from casts and drawings, and he copied and engraved in 1832 Washington Allston's picture, 'Mother and Child,' which was afterward burned. In 1833 he studied in Paris in the atelier of De la Roche. His great power was in the expression of character in individual heads. He never attempted historical or genre subjects, and only rarely grouped two or more heads together. Engravings by him may be found in the following annuals. 'Gift of Friendship' (1848); 'Religious Keepsake' (1846); 'Religious Offering' (1840); 'The Token' (1832. 1836, 1837); 'Youth's Keepsake' (1831). See 'Memoir of Seth W. Cheney, by E. D. Cheney' (Bost. 1881), and S. R. Koehler's 'Catalogue of the Works of John and S. W. Cheney.' He was married to Ednah Dow Littlehale in 1853.

Cheney, Theseus Apoleon, American historical writer: b. Leon, N. Y., 16 March 1830; d. Starkey, N. Y., 2 Aug. 1878. His publications include 'Historical Sketch of the Chemung Valley' (1866); 'Historical Sketch of 18 Counties of Central and Southern New York' (1868); 'Laron'; 'Relations of Government to Science'; and 'Antiquarian Researches.'

Chénier, shā-nyā', **Andre Marie de,** French poet: b. Constantinople 30 Oct. 1762; d. Paris 20 July 1794. He went to France when very young, and entered the army, but left six months after to devote himself to literary pursuits. He was for about three years secretary to the French embassy at London, but in 1790 returned to Paris. Advocating the doctrine of a limited monarchy, he made himself equally offensive to the Royalist and the Jacobinical party. In consequence of his attacks on the Jacobins he was condemned by the revolutionary tribunal, and executed. Although but little known in his own day, Chénier has long been regarded as one of the finest French poets of his century, his chief characteristics being purity of form combined with vigor of thought and diction. He wrote idyls, elegies, odes (including one to Charlotte Corday), dithyrambs, philosophic pieces, etc. The maturity, breadth and soundness of his judgment in poetical composition are demonstrated by his poem on 'Invention.' Of the same year is his fine idyl 'Liberty.' Similar in spirit to this, and of perfect Pindaric form, is the 'Dithyrambic on the Tennis Play' (1791). In his prison of St. Lazare he composed a beautiful elegy, 'The Girl Captive.'

Chénier, Marie Joseph de, a French dramatist, younger brother of André M. Chénier (q.v.): b. 11 Feb. 1764; d. 10 Jan. 1811. He was a Jacobin, and member of the Legislative Assembly in the Revolution. His tragedies — 'Charles IX.' (1789); 'Henry VIII.' and 'Calas' (both 1791); 'Caius Gracchus' (1793); and others — brought him fame and success by the accordance of their republican and revolutionary sentiments with the public opinion of the time, rather than by their merits as compositions. His national songs were approved by the best test of such productions,— popularity: one of them, 'The Parting Song' (*Partant pour la Syrie*), is hardly less famous than the 'Marseillaise.' His satires are full of spirit, point and wit, but often rancorous and unjust.

Chenille, shę-nēl', a round fabric or trimming, made by uniting with two or more sets of warps, either by weaving or twisting, a fine filling or weft, which is allowed to project beyond the warps. This filling is cut at its outer edges, and the fabric is then twisted, assuming a cylindrical shape with weft projecting radically from the central line of warps. The name is applied, also, to lace, carpets, and cloth made wholly or in part from silk threads twisted or woven to resemble the tufted trimming of the same name.

Chenomorphæ, kē-nō-môr'fē, an order of desmognathous birds, first proposed by Huxley and nearly equivalent to the *Lamellirostres* and *Anseres* (q.v.) of other authors. The palate is closed anteriorly by a thick bony bridge, but the vomer is well developed; the margins of the beak are more or less toothed; the tongue is thick and fleshy; and the down is uniformly distributed over the skin. All of the species are more or less aquatic; most of them are web-footed; and the young are precocial, or able to run from birth. Three very distinct families are recognized: the *Anatidæ*, or ducks, geese, and swans (qq.v.); the *Palamedeidæ*, or screamers (q.v.); and the *Phœnicopteridæ*, or flamingoes (q.v.).

Chenonceaux, shĕ-nôñ-sō. See BLÉRÉ.

Chenopodiaceæ, kē-nō-pō-dī-ā'sē-ē, a natural order of apetalous dicotyledons, consisting of more or less succulent herbs or shrubs, belonging to about 80 genera and 600 species. They are mostly innocent weeds, but several, as spinach and beet, are employed as pot-herbs; others for the manufacture of soda. See CHENOPODIUM.

Chenopodium, kē-nō-pō'dĭ-ŭm, or Goosefoot, a genus of plants belonging to the natural order *Chenopodiaceæ* (q.v.), of which it is the type, and distinguished by its hermaphrodite flowers, having five small green scales for the calyx, about five stamens, no corolla, and a fruit consisting of a membranous skin enclosing one black, flat, and shining seed. A number of the species have received the name of goosefoots, from a fancied resemblance to the webbed foot of the goose. The best-known or more remarkable species are:

1. *C. rubrum* (red goosefoot), a common annual, generally found in muddy ground. It has a leafy angular stem, which, as well as the whole plant, is often red. It bears a great number of black seeds, not larger than grains of sand, which are much fed on by birds, and seem to be relished by poultry.

2. *C. bonus henricus* (good King Henry, or wild spinach), a perennial, not uncommon in country churchyards, and places seldom disturbed. It has bright-green, broad, succulent leaves, which were in common use as spinach before the introduction of the present cultivated plant. The early shoots are sometimes used as a substitute for asparagus.

3. *C. quinoa*, the quinoa of Peru, a perennial inhabiting the high table-land of the Cordilleras, where, at the conquest of the Spaniards, it was the only farinaceous grain used as food. It is still

largely cultivated for its nutritious seeds, which are made into soup and bread, and, when fermented with millet, make a kind of beer. The plant is from four to six feet high, and has many angular branches, dull glaucous leaves, of a jagged triangular outline, on long narrow stalks, and flowers forming large compact branched heads, and succeeded by minute strong flat seeds, of a black, white, or red color. The quinoa has been introduced into Europe and is perfectly suited to the climate of England; but the grain has an unpleasant acrid taste, and will not be used as human food when anything better can be got. It is, however, an excellent grain for poultry, makes good green food for cattle, and, being of easy cultivation, may not be without economical value. Very large crops of seed have been grown in France.

In medicine *Chenopodium, ambrosioides,* var. *anthelminticum* is used very extensively as a remedy for the round worm as well as the tapeworm. The oil is the official part used, in doses of 5 to 15 drops, and it is a very efficient anthelmintic, particularly for the round worm, *Ascaris lumbricoides.*

Chen'owith, Caroline van Dusen, American writer: b. Louisville, Ky., 29 Dec. 1846. She has lectured on English literature and history, and is the author of 'Stories of the Saints' (1880); 'Child Life in China' (1882); 'School History of Worcester, Mass.' (1899).

Cheops, kē'ŏps, the name given by Herodotus to the Egyptian despot whom the Egyptians themselves called Khufu. He belonged to the rulers who had for their capital Memphis; lived about 2800–2700 B.C., and built the largest of the pyramids. According to Herodotus he employed 100,000 men on this work constantly for 20 years.

Chephren, kĕf'rĕn, or **Cephren,** king of Egypt, the successor of Cheops and the builder of the second pyramid. The former is the form of his name as it is found in Herodotus, the latter is the name given to him by Diodorus. Herodotus informs us that his reign was in all respects as tyrannical as that of his predecessor, and that the Egyptians, animated by a feeling of hatred against these two kings, under whom they had suffered all kinds of oppression, and during whose reigns the temples had never been opened, avoided even the mention of their names; and hence, instead of naming the pyramids after their builders, named them after a shepherd called Philition, who used the land in the neighborhood of the pyramids for pasturage. Diodorus adds that the pyramids were intended to serve as tombs for their builders, but as the people threatened to break them open and remove the bodies both the kings desired their friends to bury them in some spot where their bodies might remain undisturbed. Herodotus makes Chephren the brother of Cheops; but Diodorus says that Chembes, who is the Cheops of Herodotus, was succeeded by his son, Chabryis, who may perhaps be the same with the Chephren of Herodotus. His reign lasted 56 years.

Chepstow, chĕp'stō, a town and port in England, county of Monmouth, on the Wye River, 14 miles north by west of Bristol. It is pleasantly situated on a slope descending gradually to the river, and has spacious, well-paved, and well-lighted streets. The principal edifices are the church, a fine specimen of Norman architecture, and the old castle, the ruins of which crown a lofty cliff overhanging the Wye. The ruins of Tintern Abbey are in the vicinity. The building of iron steamships is actively carried on. The beauty of the environs is an attraction to visitors. Both the town and the castle are referred to in 'Domesday Book,' and the castle was the last English fortress to be besieged. Pop. (1901) 3,067.

Cheque. See CHECK.

Chequen, chĕk'wĕn, the leaves of *Eugenia chequen,* of the family *Myrtaceæ.* A shrub of Chile and Bolivia, whose leaves are rich in volatile oil, and are used as a tonic expectorant in much the same manner as Eucalyptus.

Chequy, Checky, or **Chequered,** in heraldry, applied to a field or charge when it is divided into squares like those of a chessboard.

Cher, shār, France, an inland department having on the north Loiret, east Nièvre, south Allier, west Indre and Loiret-Cher, between lat. 46° 26′ and 47° 38′ N., and lon. 1° 50′ and 3° 3′ E., and formed of parts of Berry and Bourbonnais. It is named from the river Cher, which traverses it southeast to northwest. Area, 7,199.34 square kilometres, or 2,779 square miles; capital, Bourges. This department is included in the basin of the Loire, which forms the greater part of its eastern boundary. The surface is in general flat, but is diversified in the north by chains of inconsiderable hills. Soil various, but fertile in the neighborhood of the Loire and Allier. Heath and sand prevail in the northern districts. The forests occupy above a sixth of the area, and furnish large quantities of fuel for the iron-works, and timber for ship-building. Pastures extensive, and sheep very numerous. Grains, chestnuts, hemp, and wine are among the important products. The best wines are those of Chanignol and Sancerre. Beets, buckwheat, and flax are also grown. The minerals consist of iron, lithographic stones, good building and grind-stones, flint, marble, ochre, and potter's earth. The preparation and manufacture of iron, called Berry-iron, is the principal branch of industry. The manufactured articles are metal goods, fine and common cloth, woolen goods, porcelain and earthen-ware, sacking, beet-sugar, nut-oil, paper, and glass. The department is divided into three arrondissements, 29 cantons, and 290 communes. Pop. 347,725.

Cher, a river of central France, rising in Auvergne in the department of Creuse, and joining the Loire from the left near Tours; length, 220 miles. It is navigable to Vierzon. This river gives name to the department of Cher.

Cherasco, kā-räs'kō, (ancient CLARASCUM), Italy, a town in Piedmont, in the province of Cuneo, near the confluence of the Stura and Tanaro, 22 miles northeast of Coni. Its fortifications, once of great strength, were demolished by the French in 1801. It was repeatedly the object of contest between the French and Austrians in the wars of Italy, terminated in 1631 by a peace concluded here; and in 1796 Napoleon, by what is called the Armistice of Cherasco, obtained a free passage for his troops through the Sardinian states. The town is well built, and has several silk-mills. Pop. 3,500.

Cherbourg, shär-boor, France, a seaport in the department of La Manche (The Channel), 196 miles west-northwest of Paris; on the north coast of the peninsula of Cotentin, and nearly due south of Southampton. It has a strongly fortified arsenal, and consists of the old or civil town, and the new or military (Port Militaire), the latter quite distinct from the former, and separated from it by the fortifications with which it is surrounded. Apart from its consideration as a naval station, Cherbourg is unimportant; it is the works by which it has been converted into a great naval fortress and place of arms that give it its special importance. These altogether have cost £8,000,000, and were chiefly carried out under Napoleon I., Louis Philippe, and Napoleon III. Foremost among them must be mentioned the *digue,* or breakwater, stretching across the entrance to the roadstead, which was formerly open to heavy seas from the north. It is more than two miles in length, of very massive construction, and consists of a western or longer and an eastern or shorter portion, forming at their junction a very obtuse angle pointing toward the north. There are a fort and lighthouse there, and, also, at either end. The breakwater alone cost about £2,700,000. The eastern entrance to the harbor, between the breakwater and the island of Pelée, is about 500 yards wide; the western entrance, between the breakwater and Fort Chavagnac (on a rocky islet), is about 1,000 yards, with a depth of 36 feet. It is the latter that large ships of war make use of.

The Port Militaire has three great basins for war vessels — an outer accessible at all states of the tide for vessels of the largest class; a floating basin communicating with this by gates; and a third communicating with both by similar gates. The aggregate water area of the three basins is about 56 acres, the depth of water being from about 30 to 50 feet. They have been excavated from the solid slate rock which forms the foundation of the entire dockyard, much of the excavated material being used in the construction of the breakwater. There are also slips for vessels of the largest dimensions, dry docks, building sheds, mast-houses, boiler-works, and in short everything necessary for the building and fitting out of ships of war. The numerous forts and other works with which Cherbourg is defended render it, if not impregnable from the sea, at least very difficult of attack. The commercial town has quite a modern aspect, the streets being generally wide, regular, well paved, and clean, but it is rather dull and uninteresting. There is an outer harbor, entered from the sea by a passage between two jetties, and an inner harbor or floating dock. The principal industry of Cherbourg is centred in the works of the dockyard, the commercial trade and manufactures being comparatively small.

Cherbourg is supposed to occupy the site of a Roman station, which is said to have borne the name of Cæsaris Burgum. Aigrold, king of Denmark, we are told, resided here about 945 A.D. William the Conqueror founded a hospital in it, and built the castle church. The English held possession of the place till about 1200. The castle, in which Henry II. frequently resided, was one of the strongholds of Normandy, and escaped the fate of the town, which, about 1295, was pillaged by an English fleet from Yarmouth; but it sustained afterward three memorable sieges, in 1378, 1418, and 1450. In 1758 the town was taken by the English without opposition, notwithstanding that the garrison was large. They kept possession of it eight days, destroyed the fortifications, carried off the artillery and the bells, and only retired after having exacted a heavy ransom from the inhabitants. The completion of the fortifications was celebrated by Napoleon III. in 1858, the festivities being graced by the presence of Queen Victoria. A statue of Napoleon I. was unveiled on the occasion. Pop. (1901) 42,952.

Cherbuliez, Charles Victor, shärl vēk-tōr shär-bü-lē-ā, French writer: b. Geneva 19 July 1829; d. Melun 1 July 1899. He belonged to a family noted for literary attainments. Having studied in the universities of Geneva, Paris, Bonn, and Berlin, he was for a time an educator at Geneva; but in 1864 became one of the editors of 'Revue des Deux Mondes.' He first gained distinction as art critic and observer of public affairs, as also by his writings, under the pseudonym G. VALBERT. He wrote a volume of art travels in Greece; 'A Horse by Phidias'; 'Political Spain'; 'Foreign Profiles'; 'Art and Nature'; etc. His works are characterized by clever treatment of the problems of domestic and social life and a fine psychological analysis, with a marked bias for description of odd characters. Among his most successful novels — and their success has hardly been less abroad than at home — are: 'Romance of a Respectable Woman' (1866); 'Ladislas Bolski's Adventure' (1869); 'Samuel Brohl & Company' (1877). The last two were dramatized, but won little popular favor on the stage. He was made a member of the French Academy in December 1881.

Cheribon, shĕr'ĭ-bŏn, Java, a province or residency on the coast toward the northwest of the island, between Krawang and Tegal. It was formerly an independent kingdom. It has a population of about 1,500,000. The productions are coffee, timber, cotton, areca-nuts, indigo, sugar, and also a little pepper. The rhinoceros is native here. The capital of the province, of the same name, is on the north coast, at the mouth of the river Cheribon. The houses are mostly of bamboo. The finest tomb in Java, that of Mulano, who introduced Mohammedism into the island, 1406 A.D., is near here. Population of the city, about 15,000.

Cherimoyer, chĕr-ĭ-moi'ẽr, the fruit of the *Anona cherimolia,* a plant of the order *Anonaceæ,* native of South and Central America, allied to the custard-apple. It is a heart-shaped fruit with a scaly exterior, and numerous seeds buried in a delicious pulp. Both flowers and fruit emit a pleasant fragrance. This fruit is now cultivated in various tropical regions.

Cherith, kē'rĭth, the name of a brook to which Elijah was sent during a portion of the years of famine (1 Kings xvii. 3–7), but the locality of which is no further designated than that it was before or on the face of Jordan. The most probable opinion is that it is to be sought for on the east side of the Jordan.

Cherkask, chĕr'kask, or **Tcherkask,** two towns of Russia, in the government of the Don Cossacks, called Old and New Cherkask, or Staro-Cherkask and Novo-Cherkask. The former is on the right bank of the Don; the latter

is 11 miles farther north, on a hill above the Aksai. Old Cherkask, a very ancient place, the foundation of which is attributed to a Greek colony, is situated on an island formed by the Don, the Aksai, and one of its branches, and is built on piles, as a protection from the inundations which continue from the beginning of April till the end of June. New Cherkask, founded in 1805, has a large cathedral and various other churches, elementary and higher schools, etc., and carries on a considerable trade. It is the seat of government of the Don Cossacks. Pop. 38,476.

Cherm'side, Sir **Herbert Charles,** English general: b. Wilton, Wiltshire, 31 July 1850. He was educated at Eton and entered the army in 1868, and after successive promotions attained the rank of major-general in 1898. He was with the Egyptian army, 1883–8; consul for Kurdistan, 1888–9; military attaché at Constantinople, 1889–96; and has been governor of Queensland from 1902.

Cher'okee («uplanders,» their own name; also rendered Tsaraki, Tsalaki, and Tsanaghi), the largest and most important Indian tribe originally east of the Alleghanies, perhaps the highest in culture and intellectual receptivity north of Mexico. They are of Iroquoian stock, though remotely, and are believed to be identical with the Tallagewi of Delaware tradition, a large tribe once occupying the Ohio and Alleghany valleys, till driven south by the Delawares and Iroquois. Their own tradition, that they came from the west and exterminated a certain «moon-eyed people,» does not contradict this. The first white men who encountered them were those of De Soto's expedition in 1540. Our first definite information finds them located along the south — Alleghany and Appalachian ranges and the Piedmont region adjoining, from Virginia to Georgia and Alabama, a range about 120 miles square — and divided into two main branches speaking different dialects: the Otari Tsaraki or Atali Tsalaki (Upper Cherokees), whose main settlements were around the headwaters of the Tennessee and Cumberland; and the Erati Tsaraki or Elati Tsalaki (Lower Cherokee), centred in northern Georgia and southern North Carolina, around the head-waters of the Savannah and Chattahoochee. These location names, however, had become fixed tribal names, and persisted after the Upper Cherokee had been forced south into the region of the others. They were further divided into seven clans, forbidden to intermarry. Lying close to the stream of immigration in the southern colonies, they fill the most conspicuous place in the Indian wars, trade, and treaties of that section in the 17th and 18th centuries; and their chief southernmost town, Etowah, gave a name to the famous frontier fortress Ninety-Six (96 miles from it). At the beginning of the 17th century they are said to have had 64 towns and 6,000 warriors, the latter declining to 3,000 in 1769 and 1,500 in 1793; but the figures are very dubious. At any rate, they had many villages of well-built log-houses, and the Upper Cherokee were agriculturists, raising large crops of corn, beans, and pumpkins; the Lower were chiefly huntsmen. They sided with the English in the early colonial struggles, and in 1730 formally recognized the supremacy of the English king (though it may be doubted if they attached that interpretation to their marks). In 1755 they ceded a large tract of land to South Carolina under Gov. Glenn, and Fort Loudoun was built in their territory, it is said by their own request. But after the reduction of Fort Duquesne in 1758, the slaughter of some Cherokees for horse-stealing set the whole tribe aflame, and they requited the massacre ten-fold. The folly of the then governor of South Carolina (Littleton) prevented an arrangement from being made, and a fearful Indian war desolated the borders till 1761, when the harrying of their lands for a month and the burning of 14 villages caused them to sue for peace. Their principal chiefs at this time were Attakullakulla or Little Carpenter, and Oconostota. In 1773 they made a large cession to Georgia.

In the Revolution, like most other Indians, they joined the English, their natural interests being against the Americans; and also like the others, their alliance won no victories for England, but helped lose her the country from the immeasurable odium it excited. Gen. Pickens at last subjugated them; and by a treaty at Hopewell, 28 Nov. 1785, they acknowledged the sovereignty of the United States. This was confirmed by that of Holston, in 1791, with a cession of territory; and other treaties and cessions followed in 1793, 1804, 1816, etc., ending 27 Feb. 1819. The United States on its part solemnly guaranteed to the Cherokees the possession of all lands not ceded by them, recognized their autonomy, and on 30 March 1802, authorized the President to expel trespassers, especially surveyors, by force. In 1790 a portion of the tribe emigrated to Louisiana; and others, mainly Lower huntsmen, later removed from time to time beyond the Mississippi, till in 1817 there were some 3,000 north of the Arkansas in the present Indian Territory. But the remainder showed an adaptability not equaled by any other Indians, and began a vigorous civilized career, which however only postponed their evil day for a few years. Two influences conduced to this besides their character,— the missionaries and the half-breeds: for almost alone among Indians, the mixture of white blood has prospered with the Cherokees. This blood, however, was singularly fine — that of the best Scotch families, in some cases noble: the Rosses, Adairs, McLeods, McDonalds, etc. After the rising of 1745 a number of these, irreconcilable or «wanted,» emigrated to the Carolinas; in the Revolution, not unnaturally, they became loyalists; when it ended and a fresh outlawry menaced them, some of them and their sons pushed on into the Cherokee country, settled there, and intermarried with the native women. The Moravian missionaries had been working among the Cherokees from 1740, and had baptized a considerable number before the Revolution. In 1799 some of the tribe earnestly requested teachers and clergy. A great council was held at Tellico on the Tennessee, at which the Upper chiefs agreed to the plan, but the Lower dissented. In 1804, however, schools and missions were opened, a large part of the tribe were soon Christianized, and the sons of the chiefs attended the schools. The American Board worked successfully among them later.

The Cherokees were now perfectly peaceable, industrious, and rapidly growing civilized in the genuine sense; and they did good service to the United States in the War of 1812. In 1810 they

abolished the clan system and blood-feuds. In 1820 they organized a regular civilized government, including a legislature with paid members, and adopted a code of laws. In 1827 they took the name of The Cherokee Nation, and framed a constitution. In 1825 the Cherokee Sequoyah (q.v.) invented an alphabet of 85 letters, one for each sound in Cherokee, and it was officially adopted by the Cherokee government. In 1827 the first Indian press north of Mexico was established, and on 21 Feb. 1828 the first number of the *Cherokee Phœnix* was issued at New Echota, one-half printed in the new alphabet. But the nation's time had come, hastened by the discovery of gold, which they worked successfully. Georgia, on 24 April 1802, as consideration for ceding western lands to the United States, had stipulated that the Indian titles to lands within the State should be extinguished "as soon as it could be done peaceably and on reasonable terms." The government did its best, but found that it had promised the impossible. In 1808 both the Lower (hunters) and the Upper (farmers) sent deputations to Washington. The former expressed a desire to remove to the virgin hunting-grounds of the West, the latter to retain their own. The former, therefore, on 8 July 1817, were granted an exchange of lands to the West. This left about 5,000,000 acres of Georgia in the hands of the Cherokees, and 4,000,000 in those of the Creeks, or about 14,000 square miles in all, nearly a quarter the present area of the State,—the whole northwestern triangle above the line of Atlanta (which was Cherokee land) and Gainesville. In 1819 Georgia began to grow impatient, and memorialized the President to carry out the agreement of 1802. But the remaining Cherokees loved their beautiful and salubrious country, which they had covered with improvements; they had not much more in that mountain country than they needed; and the reports from Indian Territory were that their brethren were being badly harassed by the wild tribes of the plains. They refused to sell as a nation; by all Indian law, confirmed by the United States, no individual could sell, as the land belonged to the tribe; and to prevent sales they dared not disallow, the Cherokees in 1820 passed a law making such sale a capital offense in any member of the tribe. The Creeks duplicated this action in 1824. There was therefore no way for Georgia to rid herself of these two huge Indian states within her borders except by naked violence in defiance of United States treaties. She did so first with the Creeks, 1826–32, openly defying the United States, and proclaiming the separate sovereignty of Georgia (see CREEKS; NULLIFICATION); then in 1828–30 (see title below) passed laws extinguishing the government of the Cherokees and parceling out their land. The President (Jackson) would give no help, the supreme court said it could not; but the Cherokees clung desperately to their land even under the new legislation. Finally, on 29 Dec. 1835, a small fraction of the tribe, headed by a few influential men, were induced by an emissary of the United States to sign a cession of all tribal lands, in exchange for others in Indian Territory and the sum of $5,700,000, and agree to entire removal within three years. This was of course perfectly invalid; the leaders were immediately assassinated, and were execrated as bribed traitors. There is, however, no reason to doubt their good faith to the nation. One of them was the still remembered Elias Boudinot, editor of the *Cherokee Phœnix,* who was educated at Cornwall, Conn., and married a Connecticut wife. They probably thought the nation could make better terms by yielding than by holding out. The bulk of the tribe, however, repudiated the treaty, and, refusing to go in 1838, were deported by an armed United States force, after a strong resistance and some bloodshed. Many hundreds, however, escaped on the march, lingered about in the woods, and finally concentrated near the Great Smoky Mountains in western North Carolina, where about 1,400, called the Eastern Band, still live, mainly in Swain, Graham, and Jackson counties. Of those who went, thousands are said to have died on the march or from resultant hardships. The number deported is unknown: probably between 10,000 and 20,000.

The chief of the tribe for nearly 40 years (1828–66) was the able John Ross (q.v.), or Kooweskoowee, a Scotch half-breed; and after fighting the removal to the last, when the crisis came he superintended it. When the tribe had gathered in Indian Territory it resumed its form of government and made Tahlequah the capital; and in 1845 resumed publication of a national paper, the *Cherokee Advocate* — which, however, was suspended in 1854, the present paper of the name dating only from 1870. The nation was doing well till the Civil War came for a blight. The Cherokees were almost equally divided in sentiment; their treatment by Georgia had been capped by that of the national government, and after all they were southerners by birth and industrial sympathies, and slaveholders. Each section furnished a large body of troops to its chosen side, and in consequence each side in turn ravaged the country as a hostile land, and with the consideration usually shown by whites to Indian property; and the land was almost swept bare. After the war they made a new treaty with the United States, freeing their slaves and admitting them to full citizenship in the tribe; and in 1866 they absorbed the remnant of the Delawares. Since then their land has been opened up by railroads, despite their protests. The case of Cherokee Nation v. Southern Kansas Railway, 1889, decided that the United States had right to grant eminent domain through their territory, and in fact four trunk lines traverse it. In 1892 they sold their great western extension, known as the Cherokee Outlet, and it forms the larger part of northern Oklahoma. Their region is the whole of Indian Territory north of the Arkansas. Their present government is by an elected principal chief, and a legislature with two chambers. But their long struggle for national existence is drawing to a speedy close. The open policy of the United States government is to substitute allotment in severalty for tribal ownership as fast as possible, and put an end to the anomaly of independent tribes with a figment of sovereignty which only makes hardship to government, tribe, and innocent outsiders alike. No tribe is better fitted for it than the Cherokee; generations of good living and civilization have not only tamed and elevated the Indian character in them, but greatly modified even the Indian physiognomy; there are scores of full-blooded Indian ladies in Tahlequah scarcely distinguishable from whites save for duskiness of

skin. A thorough system of public schools among them has been one of the chief instrumentalities in refining both face and character at once. Their number in Indian Territory in 1900 was 25,639; but the Cherokees proper in this enumeration are thought not to be much above 20,000.

Cherokee Nation v. Georgia, the classic case (1831) on the relations of the Indian tribes toward the United States government. (For the preliminary history, see CHEROKEE.) The means taken by Georgia to oust the Cherokees were as follows: By six successive acts, from 20 Dec. 1828 to 22 Dec. 1830, Georgia laws and jurisdiction were extended over all inhabitants of the Cherokee territory, and resistance to her writs made indictable; Cherokee laws, usages, legislative assemblies, and courts were abolished, and execution of their writs prohibited; Cherokees were declared incapable of testifying against or making contracts with white men, but the execution of the Cherokee laws against selling land to white men was punished as murder; their lands were ordered surveyed and distributed by lottery among the citizens of Georgia; their improvements and gold mines were confiscated; and white men were forbidden under penalty to enter their country, without a license from the governor and taking the oath of allegiance to Georgia. The Cherokees appealed at once (early in 1829) to President J. Q. Adams, to make good the government's treaty guarantees; but he, as his term was about to expire, left it to Jackson, who, as an old Indian fighter, sympathized with Georgia, refused to interfere, and advised the Cherokees to submit or remove. Their next resort was to the supreme court, but the Georgians took care not to let suits in the State courts come to a decision, and so give opportunity to appeal. At length, however, a case was found. When the Georgia authority over the Cherokee country became operative in 1830 a Cherokee named Corntassel or George Tassels killed an officer serving a writ of ouster, and was sentenced to be hanged; a writ of error was obtained from the supreme court 12 Dec. 1830, citing the State to appear; the legislature instructed the State officials to ignore it, and the sentence was carried out. The Cherokees' council then applied to the supreme court for an injunction to prevent Georgia from exercising her laws within the Cherokee country; the State put in no appearance, and the case was decided from the arguments on the other side: These were: that the supreme court has jurisdiction over cases between States of the Union and foreign countries; and that the Cherokee Nation, by repeated acknowledgment of the United States in solemn treaties, was such a foreign country, sovereign and independent. Chief Justice John Marshall for the court — Story and Thompson dissenting — decided that they were not a foreign nation in the meaning of the Constitution,— since, for example, an attempt by any other foreign nation to form a connection with them, or to trespass on their land, would be held an invasion of the rights or territory of the United States; that they were a domestic or dependent nation, in a state of pupilage, their relation to the United States being like that of a ward to its guardian, that their title to their land was only that of occupancy, the United States succeeding to it whenever their own possession lapsed; that their appeal lay to the President; that the supreme court could not call out force to resist the extension of Georgia laws over territory claimed as its own; that it could pass on the title to land, upon suit properly brought, but this question was a political one.

A second case, though not cited under this head, properly belongs with this. Under the law restricting white men's entry into the Cherokee country, 10 missionaries and others were arrested and sentenced to four years' imprisonment, in September 1831. Eight were released on making submission; two refused; and one, Rev. Dr. Worcester, brought suit for a habeas corpus in the supreme court, which gave decision in March 1832, and to the lay mind appears to have reversed its former one. It held that all the acts of the Georgia legislature with respect to the Cherokees were unconstitutional and in violation of the treaties and laws of the United States; and ordered the prisoner released as condemned on a void statute. The State refused to comply; but in place of waiting till the next term of the supreme court, to see if it would call on the United States authorities to enforce the decree, the prisoners made submission and were released. It is probable that Jackson's famous «John Marshall has made his decision — now let him enforce it,» would have prevented them from regaining freedom till their term was up.

Cherry, the name of various species of trees and shrubs of the genus *Prunus,* natural order *Rosaceæ,* closely related to the almond, peach, apricot, and plum, thus comprising one of the most important groups of fruits — the drupaceous or stone fruits. Cherries are characterized by white flowers usually in umbel-like fascicles, or in racemes, and sub-globular, mostly red, yellow, or black fruits, without bloom, and containing stout, nearly globular smooth stones. Few of the native species have attracted horticultural attention except for ornamental purposes, but some, especially the wild black cherry (*P. serotina*), are highly prized as cabinet woods and for interior house-finishing.

The cultivated cherries have been derived almost wholly from two European species, *P. avium,* and *P. cerasus.* The varieties of *P. avium* belong to four groups: mazzards, inferior seedlings common in the eastern United States; hearts, heart-shaped, soft, light or dark, sweet fruits; bigarreaus, heart-shaped, firm, light or dark, sweet fruits; and dukes, light, somewhat acid fruits. Of these four groups, the bigarreaus are the most important; they are largely grown in California and shipped to the eastern markets. The hearts are somewhat grown for home on both the Atlantic and Pacific coasts, in Europe, and in Australia. The varieties of *P. cerasus* are divided into amarelle (light-colored) and morello (dark-colored) groups. The morellos are the leading acid cherries and are most popular in the eastern United States, especially in western New York, where they are largely canned for market, as well as shipped in the fresh state.

Besides these important species and their varieties, a few others have horticultural value, notably, *P. mahaleb*, a hardy, rather small European species, which is used as a propagating stock; *P. pennsylvanica*, the pin, wild red, or bird cherry, whose hardness seems to promise usefulness in the Western plains region; *P. bessyi* and *P. pumila*, the sand or dwarf cherries, which seem to grade into one another, the former producing sweet fruit, the latter acid, and which, being natives of the plains region, seem worthy of the attention of the hybridizer.

Cherries are propagated by budding upon either mazzard or mahaleb seedlings, the latter being in more general favor, especially in the West, because they are hardier, easier to grow, easier to bud, and are freer from blight in the nursery. Sweet cherries succeed best upon well-drained light loams where the moisture is abundant, but not excessive; sour kinds will stand heavier, but not wet land; neither prove profitable upon very rich soils. The ground should be thoroughly and deeply plowed and harrowed; the sweet kinds, which are large spreading trees, set 25 to 30 feet part, and the sour kinds 15 to 20 feet. The land should be kept clean by frequent cultivation until midsummer, when a clover crop should be sown. This must be turned under the following spring, and the land treated as before. Each year liberal applications of potash and phosphoric acid should be given and the trees protected from the attacks of insects and fungi by systematic spraying.

Two insects are most dreaded. One is the cherry aphis, which attacks the foliage in May. It is particularly troublesome upon the sweet kinds. Kerosene emulsion and fish-oil soap are each useful in controlling the pest. The other is the cherry slug, a shiny, dark-green worm, the larva of a four-winged black fly. The slug eats the soft tissue of the leaves between the veins. It may be controlled with air-slaked lime or arsenites. See FUNGICIDE.

The most important diseases of the cherry are brown rot, leaf-blight, and black knot, which are treated under PLUM. Mildew (*Podosphæra oxycanthæ*) is troublesome upon nursery stock. It is a gray fungus which causes the leaves to fall, but may be controlled by a fungicide. Consult: Bailey, 'Cyclopedia of American Horticulture' (1900–2).

Cherry, Wild, the bark of *Prunus serotina* collected in autumn. This is very extensively used in medicine as a vehicle basis, the syrup of the bark being used very extensively in cough remedies. It contains a small amount of hydrocyanic acid.

Cherry-laurel (*Prunus lauro-cerasus*), a shrub closely allied to the common cherry, but having evergreen leaves. It was introduced into Great Britain in the 16th century, and is well known as an ornamental shrub. It yields the celebrated laurel-water. This is a powerful poison, the strength of which (like that of peach-kernels, bitter almonds, cherry-leaves, etc.) depends upon the presence of prussic acid. Laurel-water is obtained from the leaves and flowers, or the leaves only, by distillation. This shrub is often called the common laurel, another evergreen species being distinguished as the Portugal laurel: both are distinct from the true laurel.

Cherry Valley, Massacre at. The site of this village, in Otsego County, N. Y., was made memorable by the scenes of 11 Nov. 1778. With the exception of the massacre at Wyoming in July previous, that at Cherry Valley was the greatest of those indiscriminate murders of peaceful settlers which inflamed American fury without much diminishing American resources, and loaded England with odium while not advancing her military success. It was led by Lieut. Walter N. Butler, a Mohawk Valley Tory leader, son of the more famous Col. John Butler. He had been captured at German Flats in the summer of 1777, while misusing a flag of truce to incite the inhabitants of the then Tryon County to desert the patriot cause; was sentenced to death as a spy, but unfortunately spared on the intercession of friends, carelessly guarded, and escaped, burning for vengeance on Tryon County. He selected Cherry Valley, a well-known frontier settlement, as the point to strike; because its noted beauty, and the unusual cultivation and morality of its inhabitants, would make the blow resound. Lafayette, seeing its exposed situation, had fortified it with a blockhouse the preceding spring; and Col. Peter Gansevoort, an experienced officer of high reputation, solicited the command. For some reason, however, it was given to Col. Ichabod Alden, a respectable Massachusetts officer, not used to Indian warfare. During the summer the inhabitants lived in the fort and went warily; but by November they had returned to their dwellings. On the 8th Col. Alden received a message through a friendly Indian that at a great meeting of Tories and Indians at Tioga it was resolved to attack the place; and the people begged to take refuge in the fort again. Alden pooh-poohed it as an idle Indian rumor, assured them that he would guard against a surprise, and sent out scouting parties. The party that should have beaten up Butler's went to sleep by a camp-fire on the night of the 9th, and awoke as prisoners of the enemy. Butler had obtained a company of his father's rangers, induced Brant, the great Mohawk chief, to join him, with a few hundred of his Indians, picked up a band of Senecas and other straggling Indians and Tories as he went on, and with about 700 men approached Cherry Valley. Securing from the prisoners, under threat of torture, all information as to the conditions there — as that the officers of the garrison lodged with families near the fort, instead of in it — the expedition camped about a mile southwest of the village on the night of the 10th. It snowed in the night, turning to rain in the morning. As the enemy approached under cover of the thick mist, an Indian fired on a stray settler and wounded him, but he escaped and warned the colonel. That remarkable officer thought the assailant only a straggling Indian, and paid no attention. The rangers stopped near the village to examine their guns, and the Indians sprang forward, the ferocious Senecas in advance, under their chief, Sayenqueraghta, and with them some Tories worse than themselves. In the massacre that ensued, 32 settlers, mostly women and children, besides the colonel and 15 other soldiers, were slain; 30 to 40 prisoners were taken,

also nearly all women and children; and the village was reduced to ashes. Most of the prisoners, however, were released the next day, and sent back; not, probably, from any motives of humanity on Butler's part, his hot temper and hard nature making him as cruel as the Indians, but to effect an exchange for his mother and younger brothers and sisters, in the power of the Americans. The massacre was long charged upon Brant as chief actor, but it is now known that he commanded only his own Mohawks, and kept them in hand, his object being to destroy the fort and garrison, and that the Senecas committed most of the horrors. It fact, it is notable that the only deed of humanity that day was done by a Mohawk sub-chief, and that the worst atrocity was perpetrated in cold blood by a Tory, who was afterward hanged for it.

Cherso, kĕr'sō, a long, narrow island, in the northern Adriatic, belonging to Austria, yielding wine, olives, and other fruits. It is situated on the Gulf of Quarnero, between Veglia and the mainland, and forms part of Istria. It is about 35 miles long, and the area is 105 square miles. The town of the same name stands on the west coast, and has a population (1890) of 4,725. Pop. of island (1890), 10,180.

Chersonesus, kėr-sō-nē'sŭs (Greek, a peninsula). This name has been given to several peninsulas, as (1) the Cimbrian Chersonesus, now Jutland; (2) the Taurian Chersonesus, the peninsula formed by the Black Sea and the Sea of Azoff — the Crimea; (3) the Thracian Chersonesus, the great peninsula in Thrace, now the peninsula of the Dardanelles; (4) the Golden Chersonesus, in India beyond the Ganges, supposed to be the Malay Peninsula.

Chert, a crypto-crystalline (not visibly crystalline) variety of quartz closely related to flint, but less translucent and having a more splintery fracture. In geology the term is applied to a considerable range of siliceous rocks, from the impure flints largely formed from the siliceous remains of organisms, sponges and diatoms, found in limestones and other stratified rocks, to the jasperated quartz formed by the alteration of limestones or limy sandstones. Cherts of this last type grade into jasper. See FLINT; JASPER; QUARTZ.

Chertsey, chĕs'sĭ or chĕrt'sĭ, England, a town in the county of Surrey, 20 miles southwest of London, on the Southwestern Railway, is pleasantly situated on the right bank of the Thames, over which there is a handsome bridge, connecting it with the north or Middlesex side of the river. The houses are mostly of brick, and in general well built. The church of St. Peter has a square embattled tower, and contains a tablet to the memory of Charles James Fox. A school was founded here by Sir William Perkins in 1725 for clothing and educating 25 girls and 25 boys. It is now converted into a public elementary school. There was here formerly a monastery of the Benedictine order, in which Henry VI. was interred, and where his remains lay until removed to Windsor by Henry VII. The chief industries are manufacturing iron, engineering, boat- and steam-launch building, carriage building, and cabinet work. Vegetables are cultivated for the London market. Chertsey gives name to a parliamentary division. Pop. (1901) 12,762.

Cherub (plural, cherubim), a celestial spirit which, in the angelic hierarchy, is placed next in order to the seraphim. All the several descriptions which the Scripture gives us of cherubim differ from one another, as they are described in the shapes of men, eagles, oxen, lions, and in a composition of all these figures put together. The hieroglyphical representations in the embroidery upon the curtains of the tabernacle were called by Moses (Ex. xxvi. 1) cherubim of cunning work.

Cherubini, Maria Luigi Carlo Zenobi Salvatore, mä-rē'ä loo-ē'jē kär-lō zä-nō'bē säl vä tō'rä kä-roo-bē'nē, Italian composer: b. Florence 8 Sept. 1760; d. Paris 15 March 1842. In 1773 he produced a mass, which, with other of his compositions, attracted the attention of the grand duke Leopold, who enabled him to become a pupil of Sarti of Bologna, under whom he studied from 1778 to 1782. As early as 1780 he produced his first opera, 'Quinto Fabio,' at Alessandria, and in 1784 he had already produced eight operas in the theatres of Italy. In 1785 he composed for the London Italian opera 'La finta Principessa and Giulio Sabino'; in 1788 at Turin his 'Ifigenia in Aulida'; and in the winter of the same year he brought out his 'Demophoon,' and in 1791 his 'Lodoïska,' at Paris. The latter opera established his fame, and was followed by 'Élisa'; 'Médée'; 'L'hôtellerie Portugaise'; 'Les deux journées'; 'Anacréon'; and his ballet of 'Achilles at Scyros.' In 1806 he produced 'Faniska' at Vienna; in 1809, 'Pimmalione' at Paris; in 1813, 'Les Abencerrages'; in 1814, 'Bayard à Mézières'; in 1821, 'Blanche de Provence'; and in 1833, 'Ali Baba.' He excelled most in sacred music. His celebrated mass in F for three voices, his grand 'Requiem,' his 'Messi Sacrie,' are the noblest monuments of his genius. Haydn and Beethoven pronounced him the greatest sacred composer of the age. In 1822 he became director of the *conservatoire* of Paris, with which he had been connected from the date of its foundation in 1795, and which is greatly indebted to him for its prosperity. The most important of Cherubini's literary works is 'Méthode de contre-point et de fugue,' published in 1835, containing a summary of the lessons in strict composition which for several years he had given at the conservatory. He was enthusiastically devoted to his profession, and his independence as an artist frequently manifested itself. Napoleon for a long time could not forgive him, because on one occasion, when he rudely contradicted him on some point of music, the artist replied: «Citizen Bonaparte, in the art of war you are pre-eminent, but you should leave music to those who understand it.»

Cherusci, kē-rŭs'sī, the most celebrated of all the German tribes. It is difficult to determine their exact position, owing to the fact that ancient writers sometimes confound the national league formed by the Cherusci with the tribe, properly so called. It seems probable, however, that the tribe was situated in

that part of Germany lying between the Weser and the Elbe, and having the Harz Mountains on the north and the Sudetic range on the south. This tribe was known to the Romans before 50 B.C. and it is mentioned by Cæsar as a people of equal importance with the Suevi. Their territory was first entered by the Romans under Drusus, the stepson of Augustus; and a year or two later they entered into an alliance with the Romans, and served in their armies. But when Varus attempted to make them tributary to Rome, and subject them to the Roman laws, they formed a confederation with many smaller tribes, and having decoyed Varus into the forest of Teutoburg, destroyed his whole army in a battle which lasted three days, and in which he himself was slain (9 A.D.). Upon this the Cherusci became the chief object of the attacks of the Romans. Germanicus, victorious over the Marsi and Chatti, marched against the Cherusci, whose leaders, Segestus and Arminius (the latter of whom had carried off the daughter of the former), were at war with each other. Segestus, pressed by Arminius, called Germanicus to his aid, who delivered him, indeed, from his danger, but was obliged to return after several campaigns without having obtained any permanent advantages. In the end the Cherusci were overcome by the Chatti in the second half of the first century of our era; but this seems to have been owing more to internal dissensions among themselves than to any natural superiority in their opponents. Before the end of the 4th century they appear as members of the great confederation of the Franks, and after that they are lost sight of.

Cher'vil, a popular name for several plants of the natural order *Umbelliferæ*. Leaf chervil or salad chervil (*Anthriscus cerefolium*) is an annual herb native to southern Europe, and has long been cultivated in Europe, but very little in America, for its sweet-scented compound leaves, which are used like parsley for garnishing, flavoring soups, stews, etc., and as a pot-herb. It is of easy cultivation and yields its leaves in about eight weeks from sowing the seed. In some localities it has escaped from gardens and has become a weed. Turnip-rooted or tuberous chervil (*Chærophyllum bulbosum*) is a biennial or plur-annual herb native to southern Europe and has long been cultivated for its small grayish or blackish carrot-like roots, which are eaten either like beets or as a flavoring in soups, stews, etc. Since its seeds lose their vitality very quickly, they should be sown in the autumn, or else stratified until spring. If sown in the fall they need not be expected to appear before spring. Except as just mentioned, the cultivation of tuberous-rooted chervil resembles that of carrots. The name chervil is also sometimes given to sweet cicely (*Myrrhis odorata*), a native of southern Europe, widely cultivated in Europe, where it is also known as Spanish chervil, anise chervil, and myrrh.

Chéry Philippe, fē-lēp shā-rē, French painter: b. Paris 15 Feb. 1759; d. 28 Feb. 1838. Espousing the cause of the Revolution, he took a part in the siege of the Bastile, and was successively a member of the Convention, member of the first committee of public safety, mayor of Charonne and Belleville, and chief of police in the department of the Seine. Banished by Bonaparte after the 18th Brumaire, he did not return to France until 1802. His historical paintings gained for him a high reputation.

Ches'apeake and Delaware Canal. See CANAL.

Chesapeake and Leopard, Affair of the, 22 June 1807. The Chesapeake was a 40-gun frigate destined to relieve the Constitution in the Mediterranean; Capt. James Barron was to go out in her as commander of the Mediterranean squadron. She had been refitted at the Washington navy-yard, and made final preparations at Norfolk, reporting ready for service on 19 June. On the 22d she got under way, but expecting no attack from powers at peace with this country, was in no shape for immediate action, and being four months behind time, could not wait. The gun deck was obstructed with various lumber, sick seamen were lying on the upper deck, the cables were not stowed away, the powder-horns were not filled, and the crew was raw and not exercised at the guns. At this time, in the heart of the Napoleonic wars, the high wages and relatively safe employ of the American merchant and even naval service, with the rights of American citizenship immediately obtained, raised the normal rate of desertion from the British navy so much that its officers were much embarrassed and greatly incensed; and Great Britain claimed, as for many years afterward, the right of searching neutrals for deserters and contraband. At the same time, her press-gangs crimped for service any strays who could be caught, of any nationality, and rarely gave any redress. Early in 1807 a British fleet lay off Norfolk watching to intercept some French frigates in the Chesapeake; and a boat's crew deserted bodily and escaped to Norfolk. The captain was told that they had enlisted on the Chesapeake,— which was true of only one, and he under an assumed name; and meeting the latter and another deserter in the streets of Norfolk, was defied. Another vessel, the Melampus, reported three deserters gone to the Chesapeake, but it was proved that they were native Americans illegally pressed. Admiral Berkeley, at Halifax, on complaint of his officers, ordered any of his vessels to overhaul and search the Chesapeake on meeting her outside the United States jurisdiction. The order was carried by the 52-gun flagship, Leopard, Capt. Humphreys, who, after consulting with the local commandant at Lynnhaven, followed the Chesapeake out beyond Cape Henry, hailed her, and sent a boat with a copy of Berkeley's order. Barron. who believed that he had no deserters aboard except the Melampus', which were not really such, honestly denied having any, but refused the right to search; the messenger lieutenant at once left, and within five minutes the Leopard came closer, and Humphreys announced that he should carry out his orders. Barron at once called his men to quarters, and did everything that skill, coolness, and courage could do to prepare for action, but the Leopard almost at once poured her whole broadside into the Chesapeake, and then two more in rapid succession, without the possibility of her opponent replying. Three of

the latter's men were killed, Barron and 17 others wounded, and it was certain that the vessel would be sunk in a short time if the fire kept up, and Barron, to stop a useless massacre, struck his flag. The one English deserter was hunted out and hanged, the three Americans taken and imprisoned. The mass of the country was on fire with indignation; the extreme Federalists at first justified the English course, but were compelled by public feeling to exhibit some patriotism. Even the timid Jefferson, whose course had brought on the catastrophe, interdicted British cruisers from American ports, and demanded disavowal and reparation from Great Britain, which were not given; but he did nothing to prevent the recurrence of such outrages. The unfortunate Barron, who had behaved like a brave man and good officer, and whose instructions had bound him to do nothing to bring on collisions, was made the scapegoat of the popular fury. His own captain screened himself by accusing him, and a court-martial on board his own vessel from 4–8 Jan. 1808, Capt. John Rodgers president, after acquitting him of all blame in every respect but one, found him guilty in not preparing for action as soon as he read Admiral Berkeley's order, and sentenced him to five years' suspension without pay or emoluments. The gross injustice of this is now admitted. One of the judges was Stephen Decatur (q.v.), who never ceased reflecting on Barron till the latter challenged and killed him.

Chesapeake and Shannon, Battle of, 1 June 1813. In the War of 1812, the former vessel (see above) cruised to no purpose from December 1812, till April 1813, and arrived at Boston 9 April. Her captain, Evans, left her on account of ill health, and about the middle of May was replaced by Capt. James Lawrence, famous for the brilliant victory of the Hornet over the Peacock. He accepted against his will; nearly all the officers and crew were new, and the latter second-rate, totally untrained, and sulky over questions of prize money. On 25 May Capt. Broke of the Shannon, lying outside, sent away his consort, the Tenedos, to have a fair chance to fight the Chesapeake alone, and repeatedly urged Lawrence to arrange a duel between the ships. In theory they were evenly balanced; they were of almost exactly the same length; the Chesapeake now carried 50 guns, the Shannon 52; the Chesapeake had 379 officers and crew against the Shannon's 330, but the latter had been trained for seven years under Broke himself, kept in constant artillery and other practice, and was a thoroughly disciplined fighting machine, men used to each other and the officers. On 1 June, however, Lawrence, whose experience had made him despise British skill and courage alike, sailed out to meet his enemy, and at 5.30 P.M. they engaged. After a couple of broadsides, the Shannon's shot cut the Chesapeake's stays, and the latter drifted helplessly stern foremost toward her adversary. There was no salvation but to make sail forward or to board, and both were impossible. The Shannon's broadsides and the musketry fire from her tops swept the Chesapeake diagonally from stem to stern, without the latter being able to fire a shot in reply, beating in the stern ports and killing or wounding every man on the quarter-deck and the after part, including the men at the wheel. Just before the vessels struck, Lawrence ordered up his boarding party; but almost at the same instant he fell mortally wounded by a musket ball, and was carried below. Not a living person was on the quarter deck, and Broke, with 50 boarders rushed on board unresisted just as the vessels parted. He was in deadly peril from his own guns, which killed his first lieutenant as the latter pulled down the American flag, and so fierce was the resistance from the 30 or so of the American crew who had rallied at the forecastle, that 37 of the boarding party were killed or wounded, including Broke himself. Had the rest of the crew shown even decent pluck, not one of the British would have escaped; but the upper party, heavily overmatched, were killed or driven below, and though the dying Lawrence called out from the cockpit, "Don't give up the ship! Blow her up!" the remainder refused to go above, and surrendered. The Chesapeake lost 61 killed and 85 wounded; the Shannon 33 killed and 50 wounded. The former was towed into Halifax as a prize, turned into a British war vessel, and in 1820 broken up. Lawrence died four days after the battle.

Chesapeake Bay, in Maryland and Virginia, and dividing the former State into two parts, is the largest inlet on the Atlantic coast of the United States, being 200 miles long, and from 4 to 40 broad. Its entrance, 12 miles wide, has on the north Cape Charles, and on the south Cape Henry, both promontories being in Virginia. The bay has numerous arms, which receive many navigable rivers, such as the Susquehanna on the north, the Potomac, Rappahannock, and York on the west, and the James on the southwest. Unlike the shallow sounds toward the south, this network of gulfs and estuaries, with its noble feeders, affords depth of water for ships of any burden, virtually carrying the ocean up to the wharves of Baltimore and the arsenal of Washington.

Chesapeake Bay Dog, the American retriever, so named from the district in which it first became well known. It is a large animal, with a thick coat about an inch and a half long, with an under coat of soft woolly fur to protect the skin. Its legs are rather short, and the feet are well webbed, and it is held to be the finest retriever in the world.

Chesapeake Stage. The rocks of the Chesapeake Stage, a younger Miocene of the Atlantic coast, are clays and marls in the north, and marls and limestones in the south. They differ chiefly from the older Miocene, or Chattahoochee and Chipiola Stages, in the character of the fossils, particularly in the north; these fossils indicating that the climate was much colder in the newer than in the old Miocene. This change of climate is believed to have been due to a change in the direction of the Gulf Stream, which flowed farther from the coast than before. The stage is well developed at Duplin County, N. C., at Yorktown, Va., and along rivers in Maryland. Strata of this age are found at Martha's Vineyard, Mass., and in Texas. See MIOCENE SERIES; TERTIARY SYSTEM.

Chesebro, chĕz'brō, **Caroline,** American novelist: b. Canandaigua, N. Y., 30 March 1825; d. Piermont, N. Y., 16 Feb. 1873. In 1851 a collection of her writings was published entitled 'Dream Land by Daylight: a Panorama of Romance.' This was followed by 'Isa, a Pilgrimage' (1852); 'Victoria, or the World Overcome' (1856); 'Philly and Kit' (1856); 'Peter Carradine' (1863); 'The Beautiful Gate, and Other Tales' (1863); 'The Foe in the Household' (1871); her best work.

Cheselden, chĕs'ĕl dĕn, **William,** English surgeon and anatomist: b. near Melton, Mowbray, Leicestershire, 1688; d. Bath 10 April 1752. At the age of 22 he began to give lectures on anatomy, and in 1711 he was chosen F.R.S. In 1713 he published a treatise on the 'Anatomy of the Human Body,' long a favorite manual of the science. He continued to read his lectures for more than 20 years, during which he gradually rose to the head of his profession. In 1723 he published a 'Treatise on the High Operation for the Stone.' In 1733 was published his 'Osteography, or Anatomy of the Bones.' Cheselden obtained in 1737 the appointment of chief surgeon to Chelsea Hospital, a situation he held till his death.

Cheshire, chĕsh'ĕr, **Joseph Blount,** American Protestant Episcopal bishop: b. Tarboro, N. C., 27 March 1850. He was graduated at Trinity College in 1869, and practised law from 1872 to 1878. He was ordained to the priesthood in 1880, and, after holding various rectorships, became Bishop of North Carolina in 1893.

Cheshire, or **Chester,** a maritime county of western England, bounded by seven other counties in England and Wales, by the estuaries of the Dee and Mersey, and by the Irish Sea. Its area is 1,026 square miles, of which the greater part is under cultivation. The surface is generally level, the soil mostly a rich reddish loam variously clayey or sandy. There is some of the finest pasture land in England; and cheese, the main product of the Cheshire farmer, is made in great quantities. Extensive tracts of land are cultivated as market-gardens, the produce being sent to Liverpool, Manchester, and other towns. Minerals abound, especially rock-salt and coal, which are extensively worked. Cotton manufacture is carried on at Stockport, Stalybridge, and in the northeastern district, ship-building at Birkenhead and other places. There are numerous railroad lines and a splendid system of canals. The principal towns are Chester, the county town, Macclesfield, Stockport, Birkenhead, and Stalybridge. Pop. 815,000.

Cheshire Cheese. See CHEESE.

Chesney, chĕs'nĭ, **Charles Cornwallis,** English soldier and author: b. 6 Sept. 1826; d. 19 March 1876. He was a well known military engineer, but was still better known as a writer on military themes, publishing 'Campaigns in Virginia' (1863); 'Waterloo Lectures' (1868); 'Military Biographies' (1870). The last named volume contained essays on Gens. Grant and Lee. He was a nephew of F. R. Chesney (q.v.).

Chesney, Francis Rawdon, English explorer: b. Annalong, County Down, Ireland, 1789; d. Mourne 30 Jan. 1872. He was gazetted to the Royal Artillery in 1805. In 1829 he inspected the route for a Suez canal which he proved to be practicable. His first exploration of the route to India, by way of Syria and the Euphrates, was made in 1831, and he made three other voyages with the same object. The idea was taken up by government, who made a grant of £20,000 after his first expedition, but owing to the opposition of Russia it was never brought to a practical issue. He commanded the artillery at Hong Kong from 1843 to 1847. In 1850 he published his 'Expedition for the Survey of the Rivers Euphrates and Tigris,' and in 1868 a 'Narrative of the Euphrates Expedition.' See 'Life,' edited by Lane-Poole (1885).

Chesney, SIR **George Tomkyns,** English writer: b. 1830; d. 1895. He was a colonel in the army, and later a general and K.C.B. and sat in the House of Commons for Oxford in 1892. But he will be longest remembered for his remarkable realistic 'Battle of Dorking' (q.v.) (1871); and his brilliant novel, 'The Private Secretary' (1881).

Ches'nut, Victor King, American botanist: b. Nevada City, Cal., 28 June 1867. He graduated at the University of California in 1890 and pursued post-graduate work at the University of Chicago and at Columbia University. In 1894 he became assistant botanist in charge of poisonous plant investigation, carried on by the United States Department of Agriculture. He has written: 'Principal Poisonous Plants in the United States'; 'Thirty Poisonous Plants of the United States'; and 'Preliminary Catalogue of Plants Poisonous to Stock.'

Ches'nutt, Charles Waddell, American author: b. Cleveland, O., 20 June 1858. While still a child he was taken to North Carolina, where he was educated, becoming subsequently principal of the State Normal School at Fayetteville. He removed to New York and entered journalism temporarily, returning later to Cleveland, where he was admitted to the bar in 1887. He has written 'The Conjure Woman'; 'The Wife of His Youth and Other Stories'; 'Life of Frederick Douglass' (in 'Beacon Biographies'); 'The House Behind the Cedars'; and 'The Marrow of Tradition.'

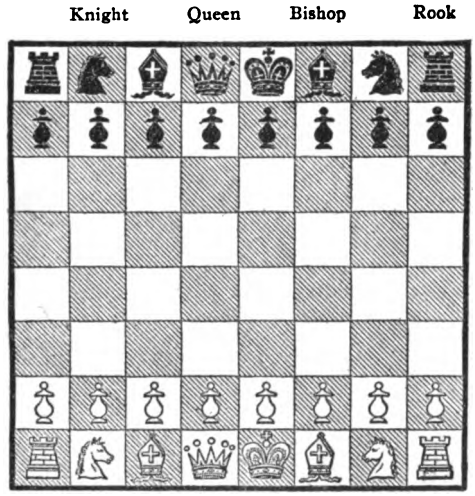
Chess, a well-known game of great antiquity and of Eastern origin, having probably arisen in India, and thence spread through Persia and Arabia to Europe. The name itself, as well as many of the terms used in the game, are clearly Eastern, the word "chess" being formed from the old French *eschecs,* from Persian *shâh,* "a king"; "rook" is from the Sanskrit *roka,* meaning a "ship" or a "chariot"; "checkmate," from Persian *shâh, mât,* "the king is dead." The game is played by two persons on a board, which is divided into 64 squares arranged in eight rows of eight squares each, alternating black and white, or black and red. Each player has 16 men, eight of which, known as "pawns," are of the lowest grade; the other eight, called "pieces," are of various grades. They are, on each side,

«king» and «queen»; two «bishops,» two «knights,» and two «rooks» or «castles.» The board must be placed so that each player shall have the single white square of his rear row to his right hand. The men are then set upon the two rows of squares next the players; the pieces on the first or rear row; the pawns on the second or front row, leaving between each side four unoccupied rows. The king and queen occupy the central squares, facing the corresponding pieces on the opposite side. The queen always occupies the central square of her own color. The two bishops occupy the squares next the king and queen; the two knights the squares next the bishops; the rooks the last or corner squares. The pieces standing on the king's or queen's side of the board are named respectively king's (or queen's) bishop, knight, or rook. The pawns are named from the pieces in front of which they stand; as king's, king's knight's, queen's rook's pawn, etc. For purposes of chess notation the names of the men are contracted as follows:

King	K.	Queen	Q.
King's bishop	K.B.	Queen's bishop	Q.B.
King's knight	K.Kt.	Queen's knight	Q.Kt.
King's rook	K.R.	Queen's rook	Q.R.

The pawns are indicated by adding the initial P. to the abbreviations of the names of the pieces noted above.

CHESS BOARD.



The squares on the board are known as rows and files, the rows running across the board in relation to the players, and the files directly from opponent to opponent. Each file is named from the piece which occupies its first square, and, counting inversely from the position of each player to that of the other, the rows are numbered from 1 to 8. At White's right-hand corner we have thus K.R. square; immediately above this K.R. 2; and so on to K.R. 8, which completes the file; the second file begins with K.Kt. square on the first row, and ends with K.Kt. 8 on the eighth. White's K.R. 8 and K.Kt. 8 are thus Black's K.R. square and K.Kt. square, and the moves of each player are described throughout from his own position, in inverse order to the moves of his opponent.

In chess all the men capture by occupying the position of the captured man, which is removed from the board. The ordinary move of the pawn is straight forward in the same file; a pawn never moves backward. The first time a pawn is moved it may be played forward one square or two; afterward only one square at a time. But in capturing an adverse piece the pawn moves diagonally to occupy the position of the captured man. Thus if White opens a game by playing his pawn to K. 4 and Black answers by advancing his pawn to K. 4, the pawns are immovable; but if White now plays a pawn to K B. 4 or Q. 4, Black may capture the pawn last advanced. Pawns have another mode of capture peculiar to themselves, and only available against pawns. If Black's pawn, instead of occupying K. 4, stood on K. 5, and White played his pawn to Q. 4, Black could not capture it by placing his pawn on the square it occupies, which would be a false move; but he is at liberty to make the capture by placing his own pawn on the square passed over by White's (Q. 6). This is called taking *en passant*. When a pawn, by moving or capturing, reaches the eighth square of any file, it can no longer remain a pawn, but must be exchanged for a piece. The player may choose any piece except the king, but the queen, on account of her power, is generally the one chosen. This is called «queening» a pawn, and a player may thus have several queens on the board. The moves of the pieces are not, like those of the pawns, limited to a single direction. The rook moves in any direction and for any distance that is open along the particular row or file on which it happens to stand. It can capture any obstructing man and occupy its place. The bishop's moves are unlimited in range, and may be either backward or forward; but their direction is diagonal, and they can never change the color of their square. The queen combines the moves of both rook and bishop. She is the most powerful piece on the board, and can move to, or capture at, any distance or direction in a straight line. The king is at once the weakest and the most valuable piece on the board. In point of direction he is as free as the queen, but for distance he is limited to the adjacent squares. Standing on any central square he commands the eight squares around him and no more. Besides his ordinary move the king has another by special privilege, in which the rook participates. Once in the game, if the squares between the king and either his or the queen's rook are clear; if neither the king nor the rook has moved; if the king is not attacked by any hostile man; and if no hostile man commands the square over which the king has to pass, the king may move two squares toward either rook, and the rook, in the same move, must occupy the square over which the king has passed. This is called «castling.» The knight, unlike the other pieces, never moves in a straight line. His move is limited to two squares at a time, one forward or backward and one diagonally, and he can leap over any man occupying a square intermediate to that

to which he intends to go. The knight, like the king, when on a central square, commands eight squares, but they are at two squares' distance, and all in an oblique direction. All captures in chess are optional.

The definite aim in chess is the reduction to surrender of the opposing king. The king is supposed to be inviolable; that is, he cannot be taken: he can only be placed in such a position that if he were any other piece he would be taken. Notice of every direct attack upon him must be given by the adversary saying "Check," and when the king is attacked all other plans must be abandoned, and all other men sacrificed, if necessary, to remove him from danger, cover the attack, or capture the assailant. It is also a fundamental rule of the game that the king cannot be moved into check. When the king can no longer be defended on being checked by the adversary, by moving him out of danger, by interposing, or by capture, the game is lost, and the adversary announces this by saying "Checkmate!" When, by inadvertence or want of skill, the player having the superior force blocks up his opponent's king so that he cannot move without going into check, and no other man can be moved without exposing him, the player, reduced to this extremity, cannot, without violating the fundamental rule referred to, play at all. In such a case, the one player being unable to play and the other out of turn, the game is considered "drawn," that is, concluded without advantage to either player. The position is known as a stalemate. The laws of the game must be sought in some special manual. Perhaps the best code is that given in Staunton's 'Chess Praxis.'

Chest, in man and the higher vertebrates, the cavity formed by the breastbone in front and the ribs and backbone at the sides and behind, shut off from the abdomen below by the diaphragm or midriff. It contains the heart, lungs, etc., and the gullet passes through it. See THORAX.

Chest-foundering, a disease in horses, a rheumatic affection of the muscles of the chest and fore-legs, impeding both respiration and the motion of the limbs. It in some degree corresponds with what is called pleurisy in man.

Ches'ter, Albert Huntington, American chemist and mineralogist: b. Saratoga Springs 22 Nov. 1843. He graduated from the Columbia School of Mines in 1868 and became a mining engineer. From 1870–92 he was professor of chemistry in Hamilton College. He has written a 'Dictionary of the names of Minerals'; and 'Catalogue of Minerals With Their Chemical Compositions and Synonyms.'

Chester, Colby Mitchell, American naval officer: b. New London, Conn., 29 Feb. 1844. He graduated at the United States Naval Academy in 1863; fought under Farragut in the famous battle of Mobile Bay; became captain 12 June 1896; was commandant of cadets at Annapolis 1890–4; commanded the Galena, Richmond, Newark, Minneapolis 1895–7; the Cincinnati during the war with Spain, and in 1899 was placed in command of the new and powerful battleship Kentucky.

Chester, Joseph Lemuel, American genealogist; b. Norwich, Conn., 30 April 1821; d. London, England, 26 May 1882. His earlier life was taken up chiefly with mercantile pursuits, but his strong literary tastes found expression in contributions to the 'Knickerbocker.' From 1845 to 1850 he was musical editor of Godey's 'Lady's Book,' and in 1852 became one of the editors of the Philadelphia *Inquirer*, and of the *Daily Sun*. In 1858 he went to England to sell some patent rights, but not succeeding in the undertaking, settled in London, and devoted himself to genealogical investigation. For more than 20 years he collected materials illustrating the ancestry of American families, made special researches for clients, and investigated the English descent of noted Americans, especially that of George Washington. His greatest work was the editing and annotating of 'The Marriage, Baptismal and Burial Registers of the Collegiate Church or Abbey of St. Peter, Westminster,' dedicated to the queen (1876), a work that cost him 10 years' labor, and which he generously allowed the Harleian Society to issue as one of its publications. He was a founder of this society in 1869, and edited five of its volumes. He was also a member of the Royal Historical Society, and of many other learned societies in England and America. His non-genealogical writings were: 'Greenwood Cemetery, and Other Poems' (1843); 'Treatise on the Law of Repulsion' (1853); 'Educational Laws of Virginia: the Personal Narratives of Mrs. Margaret Douglas' (1854); 'John Rogers, the Compiler of the First Authorized English Bible, the Pioneer of the English Reformation, and its First Martyr' (1861), a work of great industry and research.

Chester, England, an ancient and episcopal city, the capital of the county of Cheshire, 16 miles southeast of Liverpool. The two main streets cross each other at right angles, and were cut out of the rock by the Romans four to ten feet below the level of the houses. The houses in these streets were curiously arranged; the front parts of their second stories, as far back as 16 feet, form a continuous paved promenade or covered gallery, open in front, where there are pillars and steps up from the street below, with private houses above, inferior shops and warehouses below, and the chief shops of the town within. St. John's Church, now partially in ruins, is supposed to have been founded by Ethelred in 698. Chester still preserves its old walls, two miles in extent, and the gateways have been rebuilt during the last century. Pop. (1901) 36,281.

Chester, Pa., a city and port of entry of Delaware County, on the Delaware River, and the Philadelphia, Wilmington & Baltimore, the Baltimore & Ohio, and the Philadelphia & Reading R.R.'s, 15 miles south of Philadelphia. The favorable location and excellent shipping facilities of the city have given it a diversity of industries.

Business Interests.— Chester is the local trade centre of a very prosperous agricultural and manufacturing district. It is the site of the Roach ship yards, where several vessels of the United States navy have been built. According to the Federal census of 1900 Chester

had 315 manufactories, employing $18,977,710 capital and 7,682 hands, and having annual products to the value of $16,421,725. The principal industries were ship-building, foundry and machine-shop work, and the manufacture of cotton, woolen, and worsted goods. In 1900 there were three national banks with $700,000 capital and a surplus of $575,000, several private banking houses, daily and weekly newspapers, and an assessed property valuation of $42,000,000.

Public Interests.— Chester is connected with Media, Darby, and other surrounding towns by electric railways. It is the seat of the Pennsylvania Military College and Crozier Theological Seminary, and Swarthmore College is near-by. The notable buildings are the United States Government Building, including the post-office; the city hall, erected in 1724, of great historic interest; Chester and Homœpathic hospitals, and the public library. Besides the educational institutions mentioned, there were at the close of the school year 1897–8, 23 public schools, with 125 teachers and 5,446 pupils, and public school property valued at $500,000; a public high school, and Chester Academy.

History.— Chester was settled by the Swedes in 1643, under the name of Upland, and is the oldest town in the State. It was incorporated in 1866. Pop. (1900) 33,988.

Chester, S. C., capital of Chester County, on the Cheraw & Chester, the Chester & Lenoir, and the Seaboard Air Line R.R.'s, 65 miles north-northwest of Columbia. It is a trade centre, cotton is the chief shipping product. Pop. (1900) 4,080.

Chester Stage, the youngest of the limestones laid down in the interior sea that covered, in Lower Carboniferous or Mississippian time, much of what is now the Mississippi valley. Limestones of this stage are found in Texas, Arkansas, Kentucky, Tennessee, and Alabama, and in places reach a thickness of 600 feet. Some of the Lower Carboniferous limestones of West Virginia correspond in age to the Chester. The characteristic fossils include several genera of lamellibranchs and brachiopods. See CARBONIFEROUS; (*Mississippian.*)

Ches'terfield, Philip Dormer Stanhope, 4th EARL OF, English statesman and orator: b. London 22 Sept. 1694; d. 24 March 1773. On the accession of George I. Gen. Stanhope, his great-uncle, procured him the place of gentleman of the bed-chamber to the Prince of Wales; and the borough of St. German, in Cornwall, elected him to Parliament, though he had not yet attained the legal age. He soon acquired distinction as a speaker, which he maintained also in the Upper House after his father's death in 1726. In 1728 he was appointed ambassador to Holland, and succeeded in delivering Hanover from the calamities of the war by which it was threatened. He was afterward, in 1744, appointed lord-lieutenant of Ireland, and on his return in 1746 received the place of secretary of state; but in 1748 retired from public affairs, and devoted the remainder of his life almost entirely to study and the society of his friends. His talents as an author were displayed in several moral, critical, and humorous essays, in his parliamentary speeches, which were printed at a later period, and particularly in a collection of 'Letters to his Son' (1774), which have become famous. To the charms of wit and grace he united good sense, a thorough knowledge of the manners, customs, and the political condition of Europe, and a polished style. The moral tone of his letters, however, is low. One is shocked to hear a father recommending to his son grace of manners as the most essential quality for a man of the world, and even instigating him to licentious irregularities. Another series of letters addressed to his godson, and published in 1889, show Chesterfield in a more favorable light.

Chesterfield's Letters to His Son. (1774.) These were not written for publication, but were intended by Chesterfield to aid in training his son and forming his character; and were first given to the public after the Earl's death. Begun when the boy was but seven years old, the earlier ones are filled with rudimentary instruction regarding history, mythology, and the use of good language; later follows what has been called «a charming course of worldly education,» in which mingle philosophical truths, political sophistries, petty details regarding wearing apparel, and so on. Almost every page contains some happy observation or clever precept worthy to be remembered. The letters show evidences of the lax morality of the times; but are remarkable for choice of imagery, taste, urbanity, and graceful irony.

Chesterfield, England, a town in Derbyshire, on the Midland Railway, 24 miles north of Derby. It has a large market-place and five principal streets, and is irregularly but substantially built. Among its public buildings are a large parish church, noteworthy for its crooked wooden spire 250 feet high, a commodious townhouse, guild-hall, grammar-school, the Stephenson Memorial Hall, and the Chesterfield Institute. The principal manufactures are ginghams, lace, earthenware, leather, etc., but a majority of the working people are employed in connection with the collieries, iron-mines, quarries, and blast-furnaces of the vicinity. There are also iron-foundries, corn-mills, and engine-works. Mrs. Radcliffe, the celebrated romance-writer, was born at Chesterfield, and a branch of the Stanhope family takes the title of earl from it. Pop. (1891) 22,009; (1901) 27,185.

Chesterfield Inlet, Dominion of Canada, an inlet of Hudson Bay, 250 miles long, and 25 miles across at its widest part. It receives the waters of several rivers, and contains numerous small islands.

Ches'terton, Gilbert K., English author: b. London. He has published 'Wild Knight and Other Poems'; 'The Defendant'; 'Carlyle' (1903); 'Browning' (1903).

Chesterton, George Laval, English sporting journalist: b. London 20 July 1856. He entered a newspaper office in Exeter at 14, was bandsman in the Third Dragoon Guards, 1875–8, special correspondent to the London *Morning Advertiser* from Bechuanaland, 1884–5, and since 1892 has been sporting correspondent to the *Morning Advertiser* over the signature «Arion.» He has published: 'Racecourse Reminiscences'; 'Racing Reflections'; 'Won by a Head.'

Chestnut, chĕs'nŭt, a genus of trees, and shrubs (*Castanea*) of the natural order *Cupu-*

liferæ. The species are characterized by long male catkins and bristly ovaries (burs) which contain rounded nuts. Three species are of wide economic use, their wood being used for many purposes, their bark for tanning, and their nuts for food. In America the most important species is the common chestnut (*C. americana*, by some writers considered a variety of *C. sativa*), which is a tall spreading tree often attaining a height of 100 feet and a girth of 10 or more feet in the forests, which are usually upon high gravelly or sandy land or mountain sides where clay and limestone are absent or in but slight evidence. Its range is from New England to the high lands of Alabama and westward to southern Michigan. During the closing half of the 19th century this species attracted the attention of horticulturists, who have produced about a score of improved varieties worthy of being cultivated for their nuts. The Japanese chestnut (*C. crenata*, by some botanists considered a variety of *C. sativa*), has long been cultivated for its large nuts, which are produced by very young trees and are highly prized for food. The trees are rather dwarf, compact and symmetrical, and free from the attacks of blights, qualities which, together with their ease of propagation, have commended them to orchardists throughout the world. During the closing years of the 19th century it came into prominence in America. The European chestnut (*C. sativa*) a native of southern Europe, northern Africa, and western Asia, is a large tree which forms great forests throughout its range. Its nuts are probably more widely used as food than those of either of the other species, being a principal article of diet in the western countries bordering the Mediterranean Sea. In America it has become popular with orchardists on account of its large nuts. Of the three species the American produces the finest-flavored nuts, but they are generally much smaller than those of the other two species.

Two other American species are valued for their nuts. The tree or common chinquapin (*C. pumila*), which is usually less than 10 feet tall, but occasionally attains a height of 30 feet or even more, is found from Pennsylvania to Florida and westward to Indiana and Texas. The bush chinquapin (*C. alnifolia*, considered by some botanists a variety of *C. pumila*) rarely attains a height of five feet. It is found in the South Atlantic States and westward to Arkansas. Both these species bear small ovoid pointed nuts about half the size of ordinary American chestnuts. They are as yet little cultivated and have produced few varieties.

The various species and their varieties are readily propagated from seed. The seedlings are, however, generally grafted to choice varieties, and when the grafted plants are one or two years old they are set in orchards and cultivated like other fruits or are allowed to care for themselves. In places where chestnuts grow naturally, the sprouts which arise from the stumps of felled trees are often grafted with European or Japanese varieties, and the land pastured with sheep. The principal enemy of the chestnut is the weevil, a beetle which lays its eggs in the young nuts and destroys them or injures them so much as to prohibit their sale when mature. No satisfactory remedy or preventive has yet been discovered.

Chestnuts are eaten raw, boiled, or baked, or are used in many culinary preparations such as dressings. They are often dried and ground into flour, which is used like wheat flour in bread- and cake-making. Sometimes they are used for making confectionery. Fresh chestnuts have the following average percentage composition: Water, 45.0; carbohydrates (principally starch), 42.1; protein, 6.2; fat, 5.4; ash, 1.3.

Chesuncook (chē-sŭn'kŭk) **Lake** is in Piscataquis County, Maine. It is really an expansion of the Penobscot River, is 20 miles long, and 2,500 feet above sea level.

Chettik, chĕt'ĭk, a tree of Java, the Strychnos Tieute, yielding a very virulent poison called by the same name, more powerful than that obtained from the upas-tree, and owing its virulence to the strychnine it contains.

Chet'tle, Henry, English dramatist and pamphleteer; d. about 1607. He was editor of Greene's 'Groat'sworth of Wit' (1592), wrote 13 plays of considerable merit, and was part author of 35 others; including 'Robin Hood' in two parts; 'Patient Grisel'; 'The Blind Beggar of Bethnal Green'; and 'Jane Shore.' In Mere's 'Palladis Tamia' (1598) he is mentioned as one of the "best for comedy amongst us." Of his other works, his 'Kind-Hart's Dreame' (1593?), and 'Englande's Mourning Garment' (1603), are of interest, the former as containing an apology undoubtedly intended for Shakespeare as one of those whom Greene had attacked; the latter, a stanza supposed to be addressed to Shakespeare as "silver-tongued Melicert."

Cheval, shĕ-văl, **A** (French, from the word meaning horse), on horseback, astride any object. In a military sense, a body of troops is said to be *à cheval* of a river, if one wing is stationed on the right and the other on the left bank.

Chevalier, shĕ-vä-lē-ā, **Albert,** English comedian: b. 21 March 1861. He is of Italian, French and Welsh blood. His first appearance was at the age of eight. For many years he was associated on the stage with the Kendals, John Hare, etc. For four years he appeared in music halls, then he came into vogue as a drawing-room entertainer with his coster ballads. He has made tours in England and America and has given 1,000 recitals at Queen's Hall, London. Besides 100 sketches, monologues and plays, he has written, 'Before I Forget.'

Chevalier, Michel, mē-shĕl, French economist: b. Limoges 13 Jan. 1806; d. Montpellier 28 Nov. 1879. He was educated as an engineer in the School of Mines, joined the Saint Simonians, and suffered six months' imprisonment for promulgating the free doctrines of Père Enfantin's party. On his liberation he renounced his extreme doctrines, and was sent to the United States and to England on special missions. He became a councilor of state (1838), professor of political economy in the Collège de France (1840), member of the chamber of deputies (1846), and member of the Institute (1851). He published 'Letters on North America' (1836); 'On the Materials of Interest in France'; 'Essays on Industrial Politics'; 'Course in Political Economy'; 'His-

tory and Description of the Ways of Communication in the United States' (1840–2); 'Mexico: Ancient and Modern' (1863). He was known as a strong advocate of free-trade, and as a specialist on questions of currency. With Cobden and Bright he had a great part in the commercial treaty of 1860 between France and Great Britain.

Chevalier, shĕ-vä-lē-ā or shĕv-ạ-lēr', an honorary title given, especially in the 18th century, to younger sons of French noble families. Brought up in comparative luxury, and left at the death of their fathers almost entirely unprovided for, these men generally lived at the expense of others, as a sort of aristocratic parasites, even when they did not prefer recourse to such less honorable means of livelihood as gave occasion to the synonym for swindler, *chevalier d'industrie.* In the plays of the 18th century the chevalier is a constant figure. Both the Old and Young Pretender were each called the Chevalier by their partisans. The word is at present often used with its old meaning, and a chevalier may mean a man of honor.

Chevaux de Frise, shė-vō-dė-frēz (Friesland horses, so called because first used at the siege of Groningen, in that province, in 1658), armed beams of square timber or iron used to defend the fronts of camps, breaches, etc. They are usually from 15 to 18 feet long, and connected by chains, each being perforated with small holes to receive rods of wood or iron, pointed at their extremities, and when moved in any direction making a sort of hedge of spears.

Cheverus, shĕ-vrūs, **Jean Louis Anne Madleine Lefebvre de,** lė-fāvr dė, French bishop and cardinal of the Roman Catholic Church: b. Mayenne, France, 28 Jan. 1768; d. Bordeaux 19 July 1836. He was destined for the Church and at the early age of 12 years received the clerical tonsure: he was ordained priest in 1790. Refusing to take the constitutional oath regarding the clergy he was imprisoned at Paris as contumacious in 1792, but escaped to England. There he soon acquired the English language and engaged in missionary work, but in 1796 came to Boston, Mass., where he was soon in high repute for his kindly Christian demeanor and his graceful and winning pulpit eloquence. In an epidemic of yellow fever in the city he won the hearts of all men by his heroic self devotion in ministering bodily and spiritually to the stricken. Learning of the spiritual destitution of the Catholic Abenaki Indians on the Penobscot and the Passamaquoddy in Maine, he began the study of their language, and having attained some proficiency in it he visited their settlements and remained among them at his first visit three months; and every year thereafter he repeated his visit to them, built them a church, and procured for them a missionary priest, who thereafter till his death, 20 years later, devoted himself to their spiritual care. On the occasion of a visit of President John Adams to Boston, the two seats of honor at a public banquet were reserved for the chief magistrate and the priest. Mr. Adams' name headed the list of names of subscribers to a fund to erect a church for Cheverus' congregation. In 1810 he was consecrated bishop of Boston and entered on the duties of the episcopate with a zeal and industry that taxed his strength to the utmost, and his physicians in 1823 counseled his return to his native land. There the French king, Charles X., named him to be bishop of Montauban, and in this new field his religious and charitable zeal was not relaxed: on the occasion of a disastrous flood he harbored in his episcopal residence 300 destitute people. In 1826 he was made bishop of Bordeaux and a peer of France by King Charles X. Here in a visitation of cholera he placarded his episcopal palace as a *maison de sécours* or dispensary. At the instance of King Louis Philippe the Pope, Pius VII., in 1836 created him a cardinal. See Life, by Huen-Dubourg (1837).

Cheves, chēvz, **Langdon,** American statesman: b. Rocky River, S. C., 17 Sept. 1776; d. Columbia, S. C., 25 June 1857. He began to study law at the age of 18, entered upon his profession with superior natural qualifications and after severe discipline, he rapidly attained eminence and wealth in its practice. He was a representative in the national congress before and during the War of 1812, and was a zealous supporter of the party which carried the declaration of war. He was chairman of the Naval Committee in 1812, and of the Committee on Ways and Means in 1813, and constantly opposed the restrictive system. When Henry Clay was sent as commissioner to Ghent, Cheves succeeded him as speaker of the House. He retained this office till 1815, and not one of his decisions was reversed by the House. The bill for the recharter of the United States bank in 1815 was lost by his vote. The national bank having been rechartered in 1816, that institution under injudicious management had become hard pressed and was on the verge of stoppage in 1819, when Cheves was elected president of its board of directors. By a rigorous system of retrenchment, and by making credits only upon sufficient securities, the bank was saved, and specie payments maintained at the principal centres of commerce; but the public clamor increased against the power of an institution charged with subjecting to itself all the monetary concerns of the country, and even the national treasury. Resigning this arduous office after three years, he became chief commissioner under the treaty of Ghent for settling some of its provisions. He returned to South Carolina, concentrated his labors upon his plantation, and though retaining his interest in public affairs, declined to accept any further public office.

Chevet, shĕ-vā, a variety of the apse, almost exclusively confined to French Gothic churches. The extreme end of the chancel or choir is called the chevet.

Cheviot (chĕv'ĭ-ŭt) **Hills,** a range on the borders of England and Scotland, stretching southwest to northeast for above 35 miles. Their culminating point, known specially as the Cheviot, has a height of 2,676 feet; Carter Fell, the next in height, is a little more than 2,000 feet high. They are clothed for the most part with a close green sward, and are pastured

by a celebrated breed of sheep admirably adapted for hilly districts, and known in many of the more elevated districts of Great Britain.

Cheviot Sheep, a breed of sheep of large carcass and valuable fleece, which has been pastured from time immemorial on the Cheviot Hills, on the borders of England and Scotland, and from its powers of endurance is justly regarded as the most valuable mountain sheep of Great Britain. The peculiar features of the Cheviots are the absence of horns in both sexes; white or mottled-gray face and legs, an erect, long, and clean head, destitute of wool, while both the throat and neck are well covered, long open ears well covered with hair, and altogether a fine open sprightly countenance, with every indication of hardiness. The fleece weighs from three to four pounds, and the weight of the carcass varies in ewes from 12 to 16, and in wethers from 16 to 20 pounds per quarter. The Cheviots, though originally confined to a small area, are now spread over all parts of the kingdom, and except on the most barren and stony grazings, are far more profitable than the heath breed.

Chevreul, Michel-Eugène, mē-shĕl ė-zhān shė-vrėl, French chemist: b. Angers 31 Aug. 1786; d. Paris 9 April 1889. He was educated in his native town, and when a youth went to Paris, and was employed in the chemical factory of Vauquelin. In 1813 he became professor of physical science in the Charlemagne Lyceum; in 1824 he was made director of dyeing in the carpet manufactory of the Gobelins; and in 1830 succeeded Vauquelin in the chair of chemistry at the Museum of Natural History. He was the author of 'Lectures on Chemistry Applied to the Art of Dyeing' (1831) and other treatises on chemistry and dyeing, and an important work on the 'Principles of Harmony and Contrast of Colors,' 1839, which has been translated into English. He was a commander of the Legion of Honor, and the centenary of his birth was celebrated in Paris with much enthusiasm.

Chevreuse, chėv-rėz, **Marie de Rohan Montbazon,** môń-bä-zôń, DUCHESS DE, French political adventuress: b. December 1600; d. Gagny, near Paris, 12 Aug. 1679. When scarcely 17 years old, she married Charles d'Albert, grand constable of France, then a favorite of Louis XIII., who died four years afterward. She next became the wife of Claude de Lorraine, Duke of Chevreuse. A great friend of Anne of Austria, she incurred the hatred of Richelieu, and succeeded so well in making herself obnoxious to him, that he determined to have her arrested; but, made aware of his project, she assumed man's attire, crossed the Somme by swimming, and fled to England. For years she was an exile from France, and King Louis XIII. had been inspired by his minister with such fear of her uncontrollable spirit and cunning, that in his will he forbade her return to France. In spite of this, Anne allowed her to return, without, however, showing her the same degree of confidence as before, and the queen's coldness induced the duchess again to leave the court. Afterward she engaged in new plots against Mazarin, mostly acting in concert with Cardinal de Retz, and was once more compelled to leave France. Her intriguing spirit outlived her beauty, which had so much contributed to her former successes. She wandered through the Netherlands, Germany, and England, still persisting in plotting against her enemies.

Chevron, shĕv'rŭn, a bent bar, rafter-shaped, in heraldry. A chevron is, according to some, a third, and, according to others, a fifth of the field. A chevronel is half a chevron, and the couple close the fourth of the shield. A chevron couped is that which does not reach the sides of the escutcheon. A chevron in chief is one which rises to the top of the shield. In architecture a chevron is a zigzag molding, characteristic of Norman work.

Chevrotains, shĕv'rō tānz, a family (*Tragulidæ*) of ungulates, which though ruminant, in the general sense, differ in many respects from true deer; they resemble the true *Cervidæ* in certain minor peculiarities, and the musk-deer in others; but anatomically they are, in the main, distinct, especially in such of the more important characteristics as make naturalists class them by themselves. The chevrotains are divided into two genera, one African, and the other Asiatic, the latter genus (*Tragulus*) being that of the true chevrotains. These form a group of diminutive, hornless, deerlike animals, standing only about 12 inches high, found in southern India, Ceylon, and the Malayan peninsula. They are usually reddish, tawny, or mouse-grey in color, except the Indian mouse-deer (*Tragulus memminna*), which is flecked with white. The "water-deer" of western Africa is a kindred species, as is also the species found in the Philippines. Wherever found, these animals are sly little creatures, with a peculiarly stiff manner of walking, and given to hiding in thickets and inaccessible crags. They may, however, be readily tamed. They are considered as a survival of the Miocene form to which is also attributed the ancestry of the deer.

Chevy Chase, chĕv'ĭ chās, the name of a celebrated border ballad probably founded on some actual encounter occurring between Percy and Douglas, although the incidents mentioned in it are not historical. It is this ballad that Sir Philip Sydney speaks of when he says, in his 'Defense of Poetry,' "I never heard the old song of Percie and Douglas that I found not my heart moved more than with a trumpet"; and which is made the subject of a critique by Addison in Nos. 70 and 74 of the 'Spectator.' On account of the similarity of the incidents in this ballad to those of 'The Battle of Otterbourne,' the two ballads have often been confounded; but the probability is that if any historical event is celebrated at all in the ballad of Chevy Chase, it is different from that celebrated in 'The Battle of Otterbourne,' and that the similarity is to be explained by supposing that the incidents were borrowed.

There are two versions of the ballad bearing the name of Chevy Chase, an older one and a more modern one. The older version is sometimes called the 'Hunting of the Cheviot,' which is its original title. It begins thus:

"The Persè owt of Northombarlande,
And a vowe to God mayd he,
That he wolde hunte in the mountayns
Off Chyviat within dayes thre,
In the mauger of doughtè Dogles,
And all that ever with him be."

Neither the exact age nor the name of the author of this version is known. From the fact that it is mentioned in the 'Complaynt of Scotland,' written in 1548, where it is called the 'Huntis of the Chevot,' it is clear that it was known in Scotland before that time, and since James of Scotland is mentioned in the ballad, it may be inferred that it was not written before the reign of Henry VI., for James I. did not ascend the throne of Scotland till two years after Henry VI. had become king of England. As for the author, it is true that a manuscript of the ballad contained in the Ashmolean collection at Oxford is subscribed by one Rychard Sheale, but it is likely that this Rychard Sheale was merely one who had frequently recited the ballad, and perhaps the person who committed this old version to paper. This is probably the version with which Sir Philip Sydney was acquainted, since he speaks of it as "evil apparelled in the dust and cobweb of an uncivil age."

The age of the more modern version is no better known than that of the older one, but it is said by Dr. Rimbault to be no later than the reign of Charles II. This is the version which forms the subject of the critique by Addison in the above-mentioned numbers of the 'Spectator.' The following is the opening stanza as given in Percy's 'Reliques':

> "God prosper long our noble king,
> Our lives and safetyes all;
> A woefull hunting once there did
> In Chevy-Chace befall."

Chew, Benjamin, American jurist: b. 29 Nov. 1722; d. 20 Jan. 1810. He studied law in Philadelphia under Andrew Hamilton, and in London. He began the practice of his profession in Philadelphia in 1745; and held a number of public offices, becoming chief justice of the State in 1774. In 1776 after the adoption of the Declaration of Independence, he took a decided stand against the patriot cause, and was imprisoned at Fredericksburg, Va., because he refused to sign parole. In 1790 he became president of the high court of errors and appeals, a position which he held until the court was abolished in 1806. He lived in Germantown in a large stone house which is still standing and shows the marks of the cannonading it received during the battle of Germantown, when a party of British took refuge there and were fired upon by the American artillery. See GERMANTOWN, BATTLE OF.

Chewing-gum, a resinous gum used as a masticatory. The habit of chewing gum is perhaps peculiar to the United States. At first the resinous exudations of the spruce, cherry, etc., were employed in their native state; but with the increase of the habit the spruce supply nearly failed, and recourse was had to other ingredients. Of late years a gum known as chicle (q.v.) has come to the front as the foundation of most of the chewing-gum. The chicle gum is chopped into fine particles, dried, and then cooked in steam-jacketed kettles. At this stage sweetening and flavoring ingredients are added to the mass, which is mixed mechanically. The resulting "dough" is then kneaded on a table and rolled between rollers having knives set into their faces. These knives cut the sheets into suitable sizes for the market, and, after drying, the sticks are wrapped, packed, and shipped.

Chewink'. See TOWHEE BUNTING.

Cheyenne, shī-ĕn (Sioux, "red," i. e. foreigners = enemies: their own name = "ours"), an important Indian tribe of the great Algonquin stock, and its westernmost member except the Blackfeet. In the 18th century they lived on the Sheyenne River in eastern North Dakota, but were gradually driven southwest by the Sioux to the forks of the Big Cheyenne near the Black Hills, where Lewis and Clark found them in 1803. Originally settled agriculturists, their acquisition of horses turned them, like the other plains Indians, into nomad raiders and led to their foraying even to Mexico, and claiming lands as far apart as the upper Missouri in northern Montana, and the forks of the Platte, though they numbered but little over 3,000. The first United States treaty with them was made in 1825 in the former locality. They had already fraternized with the Sioux; and when their location at the Black Hills grew unsatisfactory, one section (the "Northern Cheyenne") joined the Ogallalla Sioux in driving the Crows from the Powder and Tongue river valleys in southeast Montana, while the remainder (the "Southern Cheyenne") moved south and formed a confederacy with their Algonquin kinsmen, the Arapaho, on the Arkansas. In 1851 a treaty was made with the Northern band at Fort Laramie, on the North Platte, to cut roads through their lands. A number of treaties were made with the Southern, but it is alleged that the commissioners neither made them intelligible nor executed them fairly; the Cheyenne, with their Indian allies, committed the usual atrocities which were their one method of retaliation; the settlers clamored for their extermination; the military desired to cow them by heavy punishments; the Indian department blamed both and wished peace. The Indian commissioner in 1864 sent some 400 Cheyenne and Arapaho to a camp at Sand Creek, Col.; Col. Chivington fell upon them 29 November (see SAND CREEK MASSACRE), and butchered 131 men, women, and children. A bloody and costly war followed; the next year the tribe consented to go upon a reservation, except a band called the "Dog Soldiers," who held out. In 1867 Hancock burned their village at Pawnee Fork, and another war with them began. On 27 Nov. 1871, Custer inflicted a crushing defeat upon them at the Washita in Indian Territory, killing Black Kettle, their chief, and compelling them to return to their reservation. The Northern band all this time remained peaceful, despite urgent solicitations from their brethren and the Sioux. Fresh treaties were made in 1866 and 1868. In 1900 the Northern Cheyenne numbered 1,357, on a reservation in the Tongue River valley, Custer County, Mont., and were increasing. The Southern Cheyenne are united with the Arapaho, in Oklahoma; their reservation was on the Canadian River, near Elreno, but was opened up in 1892. They number about 2,100, and are governed by a council of five chiefs. The Cheyenne are a tall, finely built race, the best physically of all the plains Indians except the Osages; but rather dull intellectually. Their language is one of the most difficult even of Indian tongues.

Cheyenne, Wyo., city and capital of the State, and county-seat of Laramie County; on the Union Pacific, Denver & Gulf, and Burling-

ton Route R.R.'s, 150 miles north of Denver. Cheyenne is situated on a plateau 6,075 feet above the sea and contains Fort Russell, a United States military post, and the main repair shops of the Union P. R.R. It has a fine State House, waterworks, electric lights, a public library, high school, and two national banks, and is the great beef growing centre, the shipping point for beef-cattle to eastern markets, and the supply depot for a large amount of the trade of the Rocky Mountain region. Pop. (1900) 14,087.

Cheyne, chān, **George,** Scotch physician: b. Methlick, Aberdeenshire, 1671; d. Bath, England, 13 April 1743. He started a London practice in 1702, in which year he was elected a Fellow of the Royal Society. Full living made him enormously fat, as well as asthmatic, but from a strict adherence to a milk and vegetable diet he derived so much benefit that he recommended it in all the later of his dozen medical treatises, which included 'A New Theory of Fevers' (1701); 'Philosophical Principles of Natural Religion' (1705); 'Essay of Health and Long Life' (1725); and the 'English Malady, a Treatise on Nervous Disorders' (1733).

Cheyne, Thomas Kelly, English biblical scholar: b. London 18 Sept. 1841. He was educated at Merchant Taylors' School, Worcester College, Oxford, and Göttingen. In 1868 he was elected Fellow of Balliol College, from 1880 till 1885 he was rector of Tendring in Essex. In the latter year he was appointed to the Oriel professorship of the interpretation of Scripture at Oxford, also becoming canon of Rochester. He edited the Old Testament portion of the Variorum Bible for Messrs. Eyre and Spottiswoode, and in 1884 became a member of the Old Testament Revision Company. His numerous works deal exclusively with the exposition and criticism of the Old Testament books. They include: 'Notes and Criticisms on the Hebrew Text of Isaiah' (1868); 'The Book of Isaiah Chronologically Arranged' (1870); 'The Prophecies of Isaiah' (1880–1, new ed. 1884); 'The Book of Psalms Translated' (1884); 'Job and Solomon' (1887); 'The Book of Psalms or Praises of Israel' (1888); 'Jeremiah: his Life and Times' (1888); 'The Hallowing of Criticism' (1888); 'The Origin and Religious Contents of the Psalter' (1891); 'Founders of Old Testament Criticism' (1893); 'Introduction to the Book of Isaiah' (1895); 'Religious Thought and Life Among the Hebrews' (1898); 'Isaiah, Critically Revised' (1897–9); 'The Christian Use of the Psalms' (1899). He has also written many articles on similar subjects in various periodicals, and is joint editor of the 'Encyclopædia Biblica.' Canon Cheyne's works reveal a scholarly and able attempt to reconcile the views of the advanced critics of the Bible with those belonging to the evangelical school.

Cheyne, William Watson, English surgeon. He was educated at Edinburgh University and was Hunterian professor of the Royal College of Surgeons of England, 1888–90. He has published: 'Antiseptic Surgery: its Principles, Practice, History, and Results' (1882); 'Manual of the Antiseptic Treatment of Wounds' (1885); and other important professional works.

Chézy, Antoine Léonard de, äṅ twäṅ lā-ō-när dė shā-zē, French Orientalist: b. Neuilly, France, 15 Jan. 1773; d. there 31 Aug. 1832. He began his studies in the École Polytechnique, and afterward attended the lectures of Andran, Caussin, and Silvestre de Sacy, on Oriental literature. Unassisted, he taught himself Sanskrit, and became such a proficient in it that, in 1814, a chair of Sanskrit was formed expressly for him in the College of France. Among his productions is a free French translation of the Persian poem, Medjnun and Leila. He also published Kalidasa's drama of Sakuntala, in the original, with a translation accompanied with notes (Paris 1830).

Chézy, Wilhelm von, German novelist and historical essayist: b. Paris 21 March 1800; d. Vienna 13 March 1865. He was the son of A. L. Chézy (q.v.). He acquitted himself creditably as a journalist, and wrote many popular tales: 'The Wandering Pupil' (1835); 'The Six Noble Passions' (1842); and 'The Last Janissary' (1853), among them; as well as 'Chivalry in Picture and Word' (1848), a study of much value.

Chézy, Wilhelmine Christiane von Klenck, German poet and novelist: b. Berlin 26 Jan. 1783; d. Geneva, Switzerland, 28 Feb. 1856. She received an excellent education, and was married in her 16th year to a gentleman of the name of Hastfer, from whom she separated about a year after. Madame de Genlis, who had been acquainted with her at Berlin, invited her to Paris, where she shortly afterward became the wife of Antoine Léonard de Chèzy (q.v.), but separating from him as from her former husband, she returned to Germany and engaged in various literary pursuits. She has acquired considerable celebrity by her 'Poems' (1812); 'Heart Notes During a Pilgrimage' (1833); and 'Emma's Ordeal' and other novels, but is perhaps best known as the writer of the libretto of Weber's opera of 'Euryanthe.'

Chhatisgarh, chŭt-tēs-gär', India, the southeast division of the Central Provinces, with an area, including feudatory states, of 25,013 square miles. It is mainly a vast fertile plateau, and has of late become a great centre of the Indian grain trade. Dongargáon is the capital. Pop. 3,545,000.

Chi-Li, chē-'lē', or **Pe-Chi-Li,** one of the provinces of China proper. It has an area of 57,800 square miles and is bounded north by Mongolia, east by the gulf called Pe-Chi-Li, and the province of Shan-Tung, and west by the province of Shan-Hsi. In the north there are extensive unworked seams of anthracite, and the southern portions of the province are very fertile, the chief productions being cotton, tobacco, and various cereals. Chi-Li is in many respects the most important of the Chinese provinces, containing as it does the imperial capital, Peking, the treaty port of Tien-Tsin, and the only completed line of railway in the empire. The provincial capital is Pao-Ting-Fu, 80 miles from Peking. The Great Wall runs across the whole of the north part of Chi-Li, while on the coast are the forts of Taku, and the nearest approach to a naval station belonging to the Chinese government. The province is mountainous and traversed by important rivers;

notably the Pei-Ho, the Lan, the Ho-Kien, and the Hu-to. The Yu-Ho is especially important because of its canal system. The climate is at times severe, the Pei-Ho being generally frozen over from December to March. There are Christian missionaries of many denominations throughout the province. The Belgians, the Italians, the English, and the American China Development Company hold important concessions in the province. There is a good system of telegraph lines. The exports are principally bristles, feathers, wool, skins, etc. The railway system open for traffic in 1900 was 290 miles in length, 79 miles from Peking to Tien-Tsin, 27 miles from Tien-Tsin to Tang-Kou (near Taku), 144 miles from Tang-Kou to Shan-hai-Kwan, a point where the Great Wall touches the sea, and an extension of 40 miles beyond toward Manchuria. No census has been taken since 1879 when the population was returned as 17,937,000. In 1900 the population was estimated at 25,000,000, including a large Manchu element. See CHINA.

Chiabrera, Gabriello, gä-brē-ĕl'lō kē-ä-brā'rä, Italian lyric poet: b. Savona 8 June 1552; d. Savona 14 Oct. 1637. Impatient of dependence on the great, he again and again abandoned the courts of noble patrons. He visited Rome, and resided a considerable time at Florence and Genoa, settling finally in his native place. Wherever he went he was loaded with presents and honors. Pindar and Anacreon were his models among the poets, and his countrymen named him "the Italian Pindar," but his Pindaric odes have little grace and force, being labored rather than spontaneous. Some of his little songs after Anacreon are models of elegance and grace. He wrote epic and dramatic poems also. He left a charming autobiographical sketch. His collected poems were published under the title of 'Rime.'

Chian (kī'ăn) **Turpentine,** a greenish-yellow, non-acrid turpentine or resin obtained mainly from the island of Chios (Scio), yielded by *Pistachia terebinthus,* of the order *Anacardiaceæ,* a large tree, native to the Mediterranean islands and shores. The turpentine, now used only in medicine, exudes from the tree in small quantities during the warmer months, but it is obtained at other seasons by making incisions in the bark. It is called also Cyprus turpentine.

Chiana, kē-ä'nä (the ancient *Clanis*), a river of central Italy, originally a tributary of the Tiber, watering a perfectly level valley, which its overflow rendered once the most pestilential district of Italy. The bed was deepened in 1789–1816, and in 1823 extensive hydraulic works were undertaken for further improving the river course, and for leading a north branch, through canals, to the river Arno, a few miles below Arezzo, the south stream reaching the Tiber through the Paglia at Orvieto. The double stream is 60 miles long, and one half to one mile broad; and the district has since become one of the most fruitful in all Italy.

Chianti, kē-ăn'tĭ, a district in Italy, near Siena, where what is now the best-known red wine of Italy is produced. Chianti wine is full flavored and astringent, with an alcoholic strength of about 20 per cent.

Chiapas, chē-ä'pas, a state of the republic of Mexico, on the Pacific slope, having an area of 27,111 square miles. The capital is Tuxtla-Gutiérrez. The state is in many parts mountainous, and is also in many parts traversed by fine streams, including the Rio Chiapas. At Palenque are the ruins of an ancient Aztec city of great beauty and magnitude. The valleys have a rich soil and produce maize, sugar, cotton, etc. There is a considerable export of logwood. Trade is, however, in a backward state for lack of roads. Education is free and compulsory, but the law is not strictly enforced. The state forms part of the Central American tableland, and has a fine climate, although the whole region is largely clothed in primeval forests. Pop. 364,000.

Chiari, Pietro, pē-ä'trō kē-ä'rē, Italian novelist and comedian: b. Brescia 1700; d. Brescia 1788. After completing his studies he entered the order of Jesuits, but soon changed the monastic for the secular life, and devoted himself solely to letters. He resided at Venice, with the title of poet to the Duke of Modena, and in the space of 10 or 12 years brought more than 60 comedies on the stage. Chiari and Goldoni were rivals, but the public adjudged the palm to the latter. Chiari's dramas in verse fill 10 volumes; those in prose, four.

Chiari (known to the Romans as CLARIUM), Italy, a town in Lombardy, 14 miles west of Brescia. It is well built, has several churches, two convents, an elementary school, a hospital, and a public library. It was formerly fortified, and some of its ancient defenses still exist. It has manufactures of silk, linen, and cotton, and some tanneries. Prince Eugene here defeated the French and Spanish troops, 1 Sept. 1701. Pop. 11,000.

Chiarini, Giuseppe, joo-sĕp'pĕ kē-ä-rē'nē, Italian poet and critic: b. Arezzo 17 Aug. 1833. He is a student of foreign literatures, especially English and German, and has been editor of literary journals. His verse is mostly lyrical, and has been collected under the titles: 'Poems' (1874); 'In Memoriam' (1875); 'Lacrymæ' (1879); etc. It gives proof of deep poetic sensibility. He has translated some of Heine's poems, and has published critical essays on English and German poets.

Chiaroscuro, kē-ăr-ŏs-kū'rō, or **Chiaro-oscuro,** kē-ä-rō- (It. *chiaro,* "clear"; *oscuro,* "obscure"), in painting the art of judiciously distributing the lights and shadows in a picture. A composition, however, perfect in other respects, becomes a picture only by means of the chiaroscuro, which gives faithfulness to the representation, and therefore is of the highest importance for the painter; at the same time it is one of the most difficult branches of an artist's study, because of the want of precise rules for its execution. Every art has a point where rules fail, and genius only can direct. This point in the art of painting is the chiaroscuro. The drawing of a piece may be perfectly correct, the coloring may be brilliant and true, and yet the whole picture remain cold and hard. This we find often the case with the ancient painters before Raphael; and it is one of the great merits of this sublime artist that he left his masters far behind him in chiaroscuro, though he is considered not so perfect in this branch as Correggio and Titian, who were inferior to him in many other respects. The

mode in which the light and shade are distributed on any single object is easily shown by lines supposed to be drawn from the source of the light which is shed over the figure; but chiaroscuro comprehends, besides this, aerial perspective, and the proportional force of colors, by which objects are made to advance or recede from the eye, produce a mutual effect, and form a united and beautiful whole. Chiaroscuro requires great delicacy of conception and skill in execution; and excellence in this branch of art is to be attained only by the study of nature and of the best masters. Chiaroscuro is also understood in another sense, paintings in chiaroscuro being such as are painted in light and shade and reflexes only, without any other color than the local one of the object, as representations of sculpture in stone or marble. There are some fine pieces of this sort in the Vatican, at Rome, by Polidoro da Caravaggio, and on the ceiling of the Paris Bourse by Meynier and Abel de Pujol.

Chiastolite, ki-as'to-līt, a variety of the mineral andalusite, occurring in stout crystals of prismatic aspect, and distinguished by containing carbonaceous impurities that are distributed through the interior according to a geometric scheme, so that a section of the crystal presents a tesselated appearance or shows a distinct cross. Also called "macle." The name "chiastolite" is derived from a Greek word signifying "arranged diagonally."

Chiavari, kē-ä-vä'rē, Italy, a seaport in the compartimento of Liguria, province of Genoa, on the Gulf of Rapallo, 23 miles southeast of Genoa. It has all the appearance of an old Italian town, consisting of narrow streets lined with substantial houses and open arcades. Silks, lace, etc., are manufactured, and fishing and trading are carried on. Pop. 13,000.

Chiavenna, kē-ä-vĕn'nä, Italy, a town on the Mera 38 miles north-northwest of Bergamo, in the province of Sondrio, Lombardy. It stands in a valley in the midst of magnificent scenery on the road to the Splügen, and at the junction of two passes through the Alps, and has an important transit trade. Pop. (1901) 4,788.

Chibchas, chēb'chäs, or **Muyscas,** a tribe of South American Indians who formerly lived east of the Magdalena River, occupying the region from its head waters to the Sierra Nevada de Merida. They were partially civilized and excelled in weaving and pottery making, were skilful goldsmiths and also followed agriculture to a considerable extent. They were ruled by women as well as men in the line of succession, and believed in a Supreme Being, although they worshipped the sun and stars. The Chibchas were conquered in a war with the Spaniards in 1537 and their descendants, who have intermarried with Europeans constitute a large part of the present population of Colombia.

Chibouque, chĭ-book', a long Turkish pipe having generally a wooden stem, an amber mouth-piece, and a clay bowl.

Chica, or **Chicha,** chē'chä, a South American word having several meanings.

1. A species of *Sterculia,* the seeds of which are eaten in Brazil. They are about the size of a pigeon's egg, and have an agreeable taste.

2. A red coloring matter prepared by the Indians on the upper parts of the Orinoco and the Rio Negro from the leaves of a plant native to that region called *Bignonia chica,* and with which they paint their skin, in order to be better able to resist the rays of the sun. It is of a beautiful vermilion color, and, although of a resinous nature, is not liable to become liquid under the influence of heat. It is soluble in alcohol, and stains cotton orange-yellow. It is extracted by boiling the leaves in water, decanting the docoction, and allowing it to settle and cool when a red matter falls down, which is formed into cakes and dried. It is also called *carajuru.*

3. A dance popular among Spanish South Americans. It is said to have been introduced into Spain by the Moors, and to have been the origin of the fandango, which some writers declare to be the chica under a more decent form. It is similar in character to the dance of the Angrismene performed at the festivals of Venus, and still popular among the modern Greeks.

Chica, chē'kä, **Pito,** pē'tō, or **Po'so,** a kind of beer made from maize, in general use in Chile, Peru, and other mountainous regions of South America. It was the national drink of the natives long before the appearance of the Spaniards. The most ordinary method of preparing it is to steep the grains of maize until they begin to sprout, when they are exposed to the sun. The malt thus prepared is then ground, mixed with warm water, and left to ferment. The beer, when ready, has a dark-yellow color and a pleasant and somewhat bitter and sour taste. It is consumed by the Indians in great quantities. In the valleys of the north the Indians chew the malt instead of grinding it. It is then mixed with warm water and other ingredients and allowed to ferment as before. In a short time the beer is ready. When it has been buried for some time in the earth in pitchers it has a violently intoxicating effect. This kind of chica is called *chica mascada,* and is said to be much preferred by good judges to the ordinary sort.

Chicacole, chĭk-a kōl', or **Cicacole,** India, a town in the Ganjam district, Madras Presidency, near the coast, about 567 miles northeast of Madras, notable for its fine muslin manufactures. On two occasions, namely in 1791 and 1866, it suffered much from famine, and in 1876 a flood did considerable damage to the town. Pop. 18,241.

Chicago, Ill., the second city in the Union, is in Cook County, and lies on the southwestern shore of Lake Michigan. The dome of the court-house is in north latitude 41° 53′ 6.2″, and longitude 87° 36′ 1.2″ west. The city has a shore line on the lake of 26 miles, and extends 10 miles inland. The city area, 190.638 square miles, covers a great part of the alluvial plain formed by the Chicago and Calumet rivers. The Chicago River is formed by the junction of two small rivers, the north and south branches, thus dividing the city into three portions commonly known as the North, South, and West sides, respectively. Calumet River is the outlet by which the shallow sheet of water known as Calumet Lake empties into Lake Michigan. The land on which the

city is built is level and lies quite low, the elevation above Lake Michigan being only 25 feet. The two rivers form natural harbors, which have been improved by dredging. The shore of Lake Michigan is broken by few bays or inlets, and harbors are infrequent, and, as a rule, not commodious. Wherever, therefore, a river is found, navigators eagerly use it, so far as its depth permits, as a refuge from the storms of the great lake.

Early History.— In the early days of French exploration it was found that the Indians used the Chicago River as one line of travel by which the Mississippi could be reached. Passing up the river and its south branch, a portage of only four or five miles brought the traveler to the Desplaines River, down which his canoe passed to the Illinois River, and so to the Mississippi. This route seems to have been used by white men for the first time in 1673, when Joliet and Marquette, returning from the Illinois River, were shown by the Indians the Chicago portage. It may be that they descended to Lake Michigan by the Calumet. Père Marquette spent the winter of 1674–5 in a cabin on the south branch of the Chicago River, being unable on account of physical weakness to prosecute his journey to the Illinois villages. It was in the following springtime that the devoted missionary died, while endeavoring to make his way to Mackinac by the east shore of Lake Michigan.

The French seem later to have had a fort at the Chicago portage, although it was probably a mere stockade, and no regular garrison was kept in it. This fort is mentioned by James Logan in his report to the governor of Pennsylvania in 1718, and also in the treaty of Greenville, 1795. However, the Chicago portage was not much used by the French, as they found other routes of travel safer and more convenient.

About the time of the Revolutionary War a colored man from San Domingo, Jean Baptiste Point de Saible (or au Sable), made his way to the Chicago River and established himself there as an Indian trader. Here, about 1777, he built a house of squared logs which may be regarded as the beginning of continuous settlement at Chicago. This house he sold in 1796 to a French trader, who in turn sold it in 1803 to John Kinzie, the first American settler. The house, known as the old Kinzie mansion, stood on the north bank of the river opposite the site on which Fort Dearborn was later built, and was in existence until 1837.

Kinzie was an Indian trader, and no doubt thought the Chicago a convenient centre for his business. He brought his family to his new home in 1804, the same year in which the fort was built, and thereafter continued his residence there until his death (1828).

Fort Dearborn was a mere stockade, with two blockhouses. The quarters for the garrison were enclosed in the stockade. It was situated on the south bank of the river, not far from the lake. At that time the river took a sharp turn to the south just east of the fort, and made its way into the lake over a heavy sandbar not far from what is now the eastern end of Madison Street. The bar was not capable of being crossed by anything larger than a small boat, and the schooner which, in 1804, brought the stores for the garrison had to anchor and land passengers and cargo in boats. The first garrison consisted of one company of infantry (of the First regiment). The site of the fort was on a reservation of six square miles, set aside from the United States in Wayne's treaty with the Indians made at Greenville in 1795.

The settlement at Fort Dearborn made little growth until after the War of 1812. It was far in the wilderness, being reached from Detroit by a trail through the woods, and from Mackinac by lake schooners of which usually two came each year, in spring and fall.

The Massacre of 1812.— In 1812 the second war with Great Britain broke out, and at the outset in the northwest all the advantage lay with the British and their Indian allies. Mackinac was captured, thus securing to the British the control of the upper lakes, and Gen. Hull, in command at Detroit, sent orders that Fort Dearborn should be evacuated, and that the surplus stores should be divided among the Indians. These orders were executed, and on 15 August the garrison, escorting a number of women and children, set out for Detroit by the road which wound along the lake shore. At a point among the sand hills near the eastern end of the present Eighteenth Street the savages attacked in force, and the whole body of whites were captured or destroyed. Two of the women and twelve children were butchered during the fight, and a number of the wounded men were killed afterward. The Indians then burned the fort and divided the plunder.

In 1816, after peace was fully restored, Fort Dearborn was reconstructed on a somewhat larger scale than before, and under protection of its garrison a small village slowly grew up.

Political Jurisdictions.— In the old days of French and British occupation the territory, including the valleys of the Wabash and Illinois rivers, west to the Mississippi and north to Lake Michigan, was commonly known as the "Illinois Country." The main French settlements were at Vincennes, on the Wabash, at Kaskaskia on the river of that name, and at Cahokia and Fort Chartres, on the Mississippi. In 1763, by the Treaty of Paris, the French government yielded to Great Britain all claim to land east of the Mississippi, and thus the Illinois Country became British. By the "Quebec Act" of 1774 — one of the legislative acts of the British government which led to the Revolutionary War — all of the newly acquired land between the Ohio and the Great Lakes was included in the province of Quebec, thus placing it under the arbitrary military government at that time prevailing over Canada.

In 1778 a small army of Virginia troops sent out by Gov. Patrick Henry, under command of Col. George Rogers Clark, seized Kaskaskia and Vincennes, and thus replaced British authority by American throughout the Illinois Country. The treaty of peace of 1783 drew the northern line of the new republic through the Great Lakes, instead of through the Ohio River, as doubtless would have been done had it not been for Clark's victorious expedition, and thus the site of Chicago became finally American and not British. Virginia organized the Illinois Country as a county — the County of Illinois — and under that government it continued from 1778 until the cession of all the northwest by Virginia to the United States, in 1783.

While Clark's expedition determined the exclusion of British authority from the Illinois Country, there remained a dispute as to jurisdiction over it among several of the States. Virginia claimed all the territory between the Ohio, the Mississippi and the lakes, on the ground mainly of conquest. New York claimed the same territory, on the ground of a treaty with the Iroquois, who were asserted to have extended their conquests as far as the Mississippi. Massachusetts and Connecticut claimed, under their original charters, to own all the land between their northern and southern boundary lines of latitude west of New York as far as the Mississippi. Under these various claims Chicago is in territory claimed respectively by Virginia, New York, and Connecticut. The conflicts were settled by acts of cession on the part of the various States to the United States.

After the Virginia act of cession of 1783, the authority of that State was withdrawn from the Illinois Country, and for several years the French villagers were a law unto themselves. In 1787, however, the ordinance for the government of the Northwest Territory was enacted by Congress, and thus the Chicago area came legally into that territory. In 1790 Gov. St. Clair visited Kaskaskia and formed St. Clair County from the southwestern portion of the Illinois Country. The wilderness north of that had practically no white population, and hence no local government was needed. In 1796, however, the County of Wayne was organized, which included Detroit and the Chicago area. It was in this year that the British finally withdrew their garrisons from Detroit, and the new county was named from the victor over the Indians in the campaign of 1794, who also made the Treaty of Greenville in 1795. In 1800 the Indian Territory was organized, in which all the Illinois Country was included, and in 1809 the Illinois Territory was created, including all west of the Wabash River and north to British America. When the boundaries of Wayne County were changed, in 1803, the Chicago area was left out, and it was not included within any county until 1812, when the county of Madison was formed. Under the law of the Territory of Illinois, Chicago was included in Edwards County in 1814, and in Crawford County in 1816. In 1818 Illinois was admitted to the Union as a State. Under the laws of the State Chicago was successively included in Clark County, organized in 1819; in Pike County, 1821; in Fulton County, 1823; in Peoria County, 1825; and finally in Cook County, organized 15 Jan. 1831.

The ordinance of 1787 seemed to indicate that a State in the northern part of the Northwest Territory west of Lake Michigan should have as its southern boundary a line drawn east and west through the southern extremity of that lake, and the bill for the admission of Illinois was originally drawn accordingly. Mr. Nathaniel Pope, delegate in Congress from the territory, however, succeeded in having the bill amended so as to secure the present northern boundary for Illinois. Had this not been done, Chicago would be in the State of Wisconsin.

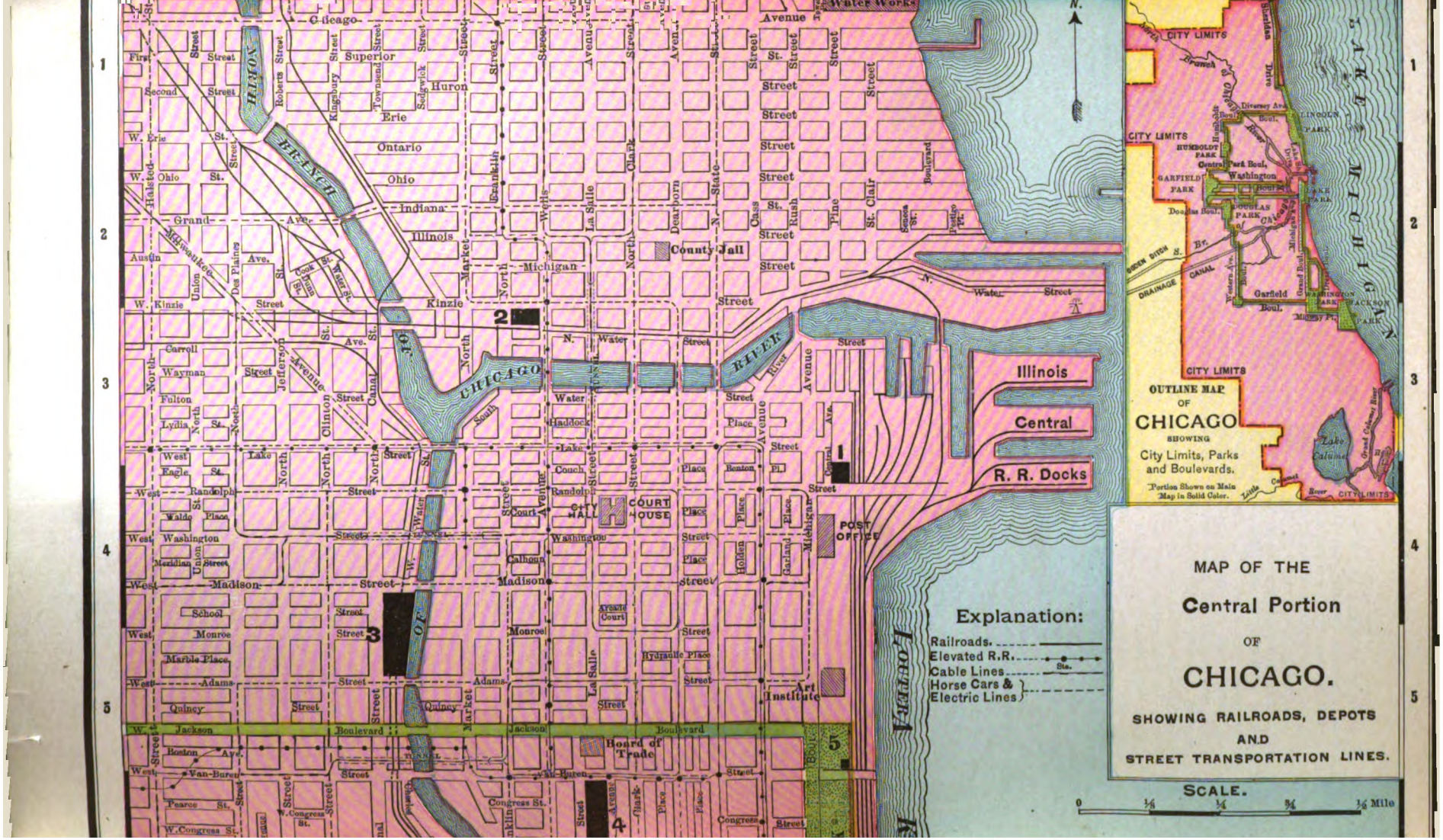
Origin of the City.— In 1830 Chicago was a hamlet of log houses inhabited by something less than a hundred people. These log houses were nearly all on the North and West sides. The beginning of the city as a prosperous town was due to the Illinois and Michigan canal, authorized by act of Congress in 1827. By this act the State was granted alternate sections of land on both sides of the canal route, and the canal commissioners proceeded to lay out towns and sell lots in order to secure funds. One of these towns was Chicago, at the eastern terminus of the canal, and the lands platted therein were sold in 1830. The town was bounded on the east by State Street, on the north by Kinzie Street, on the west by Desplaines Street, and on the south by Madison Street. Buildings began to be erected and slowly immigration began to come. The early settlement of Illinois had been in its southern counties and was derived mostly from southern States. The new migration, beginning with 1830, came in the main by way of the lakes and was largely from the East, New York and New England being especially represented. In 1833 Congress made an appropriation for a harbor at Chicago. Piers were built out into the lake, a channel was cut through the old sandbar, and the spring freshets sufficed to scour it out. It was in 1834 that, for the first time, a schooner sailed up the river. By 1837 the town had grown to have a population of 4,170, and in that year it was incorporated as a city.

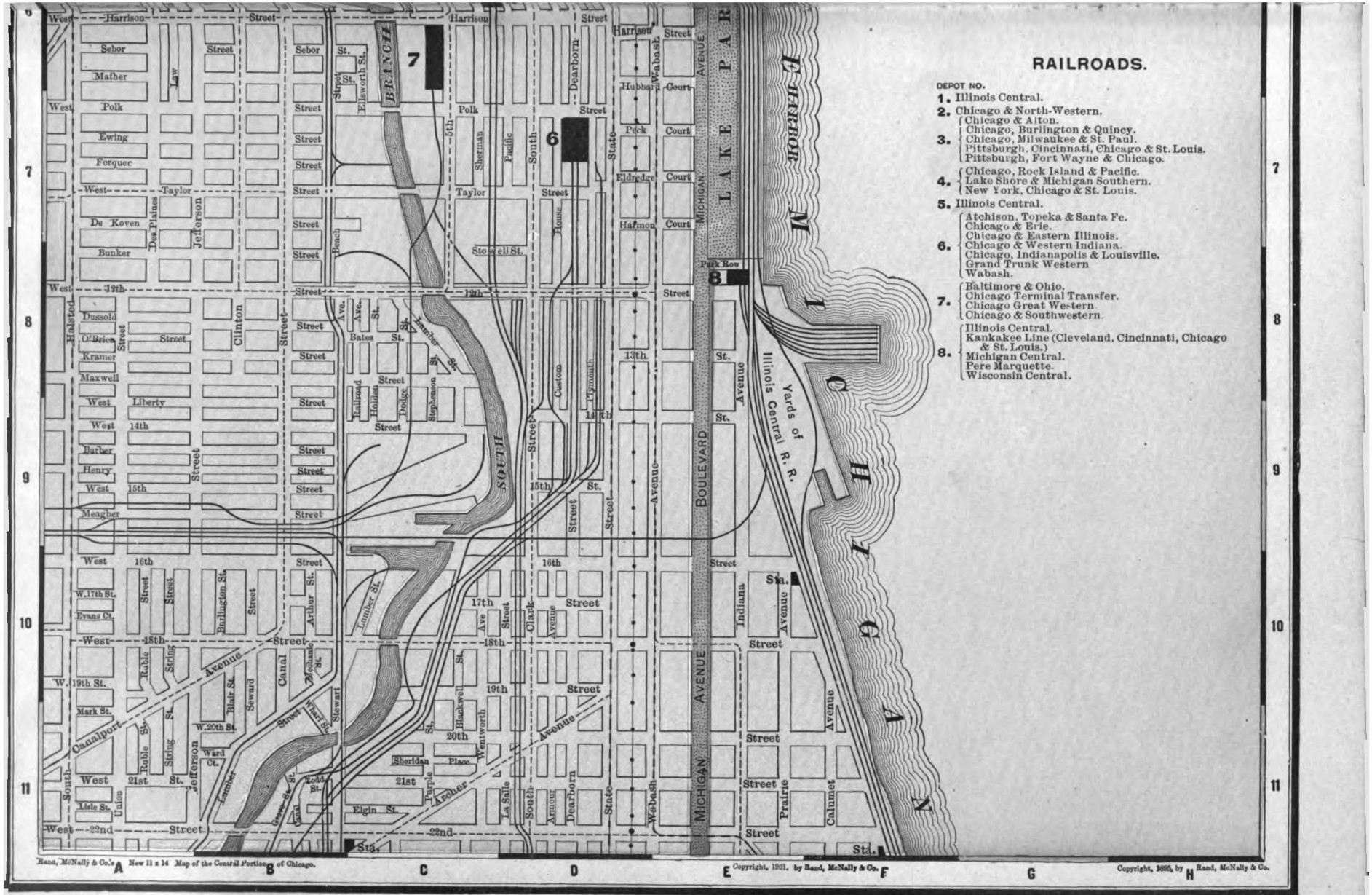
Railroads.— The canal, from which so much was expected, did not prove the wonderful success that was hoped. It was not finished till 1848. Meanwhile, however, railroad construction began and effectively opened up the prairie interior of the State, while the application of steam to navigation made it comparatively easy to transport passengers and freight between Chicago and Buffalo. In 1852 the Michigan Southern and the Michigan Central railways reached Chicago, and others speedily followed in all directions.

Population and Area.—The growth of the new city in population, slow at first, finally became very great. The area was extended also by successive annexations of contiguous territory. The 4,170 people of 1837 became 4,479 in 1840, 28,269 in 1850, 109,206 in 1860, 306,605 in 1870, 503,298 in 1880, 1,105,540 in 1890, and 1,698,575 in 1900. The city area in 1837 was 2.55 square miles. In 1900 the area was 190.638 square miles.

The Great Fire of 1871.—The year 1871 was memorable for the great fire which swept a large part of Chicago from the earth. Beginning at a little before nine o'clock on Sunday evening, 8 October, in a small barn on the West Side, the flames spread through all the three sections of the city, and were not finally extinguished until Monday night, 9 October, at ten o'clock, when a welcome rain fell. The main business and residence portion of the city was devastated. The total area of the burnt district was 2,024 acres, nearly three and a third square miles, and the value of the property destroyed was estimated at $187,000,000. The loss of life can only be conjectured — perhaps it amounted to 300 persons. The destitution which for a time fell upon the city was relieved with lavish generosity from all parts of this country and of Europe.

This appalling disaster did not daunt the people of Chicago. They began at once to rebuild the city and to reconstruct business. While many insurance companies were obliged to suspend, still some $46,000,000 were realized from this source, and fortunately the bank vaults in every instance but one were found to have preserved their contents intact. Within two


MAP OF THE
Central Portion
OF
CHICAGO.
SHOWING RAILROADS, DEPOTS
AND
STREET TRANSPORTATION LINES.
Explanation:
Railroads.
Elevated R.R.
Cable Lines
Horse Cars &
Electric Lines
SCALE.
0 1/8 1/4 3/4 1 Mile
OUTLINE MAP
OF
CHICAGO
SHOWING
City Limits, Parks
and Boulevards.
Portion Shown on Main
Map in Solid Color.
CITY LIMITS
Illinois
Central
R. R. Docks
COURT HOUSE
CITY HALL
POST OFFICE
County Jail
Art Institute
Board of Trade
CHICAGO RIVER
LAKE MICHIGAN
Chicago
Superior
Huron
Erie
Ontario
Ohio
Indiana
Illinois
Michigan
Kinzie
Lake
Randolph
Washington
Madison
Monroe
Adams
Jackson
Van Buren
Congress St.
Grand Ave.
Water Works


RAILROADS.
DEPOT NO.
1. Illinois Central.
2. Chicago & North-Western.
3. Chicago & Alton.
Chicago, Burlington & Quincy.
Chicago, Milwaukee & St. Paul.
Pittsburgh, Cincinnati, Chicago & St. Louis.
Pittsburgh, Fort Wayne & Chicago.
4. Chicago, Rock Island & Pacific.
Lake Shore & Michigan Southern.
New York, Chicago & St. Louis.
5. Illinois Central.
6. Atchison, Topeka & Santa Fe.
Chicago & Erie.
Chicago & Eastern Illinois.
Chicago & Western Indiana.
Chicago, Indianapolis & Louisville.
Grand Trunk Western
Wabash.
7. Baltimore & Ohio.
Chicago Terminal Transfer.
Chicago Great Western.
Chicago & Southwestern.
8. Illinois Central.
Kankakee Line (Cleveland, Cincinnati, Chicago & St. Louis.)
Michigan Central.
Pere Marquette.
Wisconsin Central.
LAKE PARK
MICHIGAN AVENUE
BOULEVARD
Yards of Illinois Central R. R.
CHICAGO
BRANCH
SOUTH
Harrison Street
Sebor Street
Mather
Polk
Ewing
Forquer
Taylor
De Koven
Bunker
Dussold
O'Brien
Kramer
Maxwell
Liberty
Barber
Henry
Meagher
Halsted
Jefferson
Clinton
Canal
Canalport Avenue
Archer Avenue
Wabash
Dearborn
Clark
Indiana
Prairie
Calumet
Park Row
Sta.
Rand, McNally & Co.'s New 11 x 14 Map of the Central Portion of Chicago.
Copyright, 1901, by Rand, McNally & Co.
Copyright, 1895, by Rand, McNally & Co.

years the burnt area was again covered with buildings, and of a more solid type than before the fire.

The Columbian Exposition.— In 1892–3 a World's Fair was held in Chicago, to commemorate the discovery of America four centuries before. An act of Congress, passed in the spring of 1890, authorized an international exposition in Chicago as an illustration of the development of the new world which Columbus found, made appropriations for the share of the United States government, and provided for a national commission to supervise the work. In Chicago a corporation was formed under the laws of Illinois, to undertake the practical details. Funds were provided from private subscriptions to the stock of the exposition company, from a loan of $5,000,000 made by the city, the proceeds of which were devoted to the exposition, from a special appropriation by Congress, from gate receipts, and from various concessions. The site was Jackson Park and the Midway Plaisance, an area of 666 acres being included, with a frontage of two miles on Lake Michigan. Buildings were erected on an elaborate scale, and with taste which met wide approval. The great building devoted to manufactures had a ground area of nearly 31 acres, and a floor and gallery space of 44 acres. In the central hall 75,000 people could be seated, while the entire building would seat 300,000. The standing army of Russia might have been drawn up under its roof. The entire cost of the fair was estimated at upward of $43,000,000. The number of paid admissions throughout the six months from May to November was 21,500,000, the whole number of admissions being 27,529,401.

Chicago and the Federal Government.— In Chicago are held United States courts as follows: The Circuit Court of Appeals, and the Circuit Court of the seventh judicial circuit, and the District Court of the northern district of Illinois. Pending the erection of the new United States federal building, now nearing completion, the courts are held in leased rooms.

The Chicago post-office includes the central office, 47 carrier stations, 4 stations without carriers, and 200 sub-stations. There are 1,633 clerks in the main office and stations, and 1,400 carriers and collectors. The receipts for the year 1902 were $9,175,895.88. During the same period the pieces of mail handled numbered 457,382,116 first-class, and 216,901,206 second-class, of 49,090 tons weight.

By the apportionment under the census of 1900 Illinois has 25 representatives in Congress. Six of the Illinois congressional districts lie wholly in Chicago, and four more are partly in Chicago.

The port of Chicago showed vessels entered for the year 1902, to be 8,083, with a tonnage of 7,179,053, while the number cleared for the same period was 8,164, with a tonnage of 7,229,342. The receipts of the Chicago custom-house for 1902 were $6,339,889.45. The internal revenue collections for the same period were $8,876,909.33.

Chicago and the Government of Illinois.— The General Assembly of the State of Illinois numbers 51 senators and 153 representatives, one senator and three representatives being elected from each district. Of these districts 14 are wholly and 4 are partly in the city of Chicago.

The Supreme Court of Illinois consists of seven judges elected one in each of seven districts for a term of nine years. Chicago is in the seventh judicial district. The five counties composing that district had in 1900 a total population of 2,013,353, of which Chicago had 1,698,575.

Cook County forms a judicial circuit of the State, and has (in 1903) a Superior Court of 12 members and a Circuit Court of 14 members. These courts have concurrent jurisdiction in law and equity. The members are elected for a term of six years by the voters of the county. The population of Cook County in 1900 was 1,838,735, of whom 1,698,575 were in Chicago.

Three judges of the above courts are designated by the Supreme Court of the State to sit as an appellate court, with appellate jurisdiction over the circuit, superior, and county courts. In like manner three other judges are designated by the same authority to form a branch appellate court.

The Criminal Court of Cook County is formed by judges of the Circuit and Superior courts, who alternate in the duty of holding such court. Cook County also has a County Court and a Probate Court, each consisting of one judge, elected by the people of the county, for a term of four years. All these courts sit in the city of Chicago.

As has been noted, Chicago contains 1,698,575 of the 1,838,735 people of Cook County, or 92.4 per cent. The taxable value of property in Cook County, which, by State law, is one fifth of the assessed full real value, is $433,487,627. The taxable value of property in Chicago is $402,482,319, or 92.8 per cent of that of the county. Moreover, many of the people residing in Cook County outside the limits of Chicago, have their business in the city. From these facts it is plain that Cook County is largely identical with Chicago.

The affairs of the county are administered by a county board of 15 members, elected for a term of three years. Ten are elected in the city and five from that part of the county outside the city. The president of the board is designated by the people at the election for commissioners.

The administrative officers of the county are a treasurer, clerk, sheriff, coroner, recorder, superintendent of schools, State's attorney, county attorney, a civil service commission, a jury commission, a board of assessors, a board of review, and some other officials of minor functions. The county maintains an insane asylum and poor-house, and a county hospital (the last-named being in the city). As the city has no hospital, except one for contagious diseases, the county hospital practically takes the place. Chicago is the county-seat, and hence all the county officials above named have their offices in the city. The administrative officers are in the main elective.

The City Government.— The city is incorporated under the general laws of the State for municipal corporations. The constitution of Illinois forbids special charters for corporations, and the statutes provide in detail a scheme of government for cities.

Local legislation and general administrative oversight are vested in the common council. Each of the 35 wards elects two members, for a

term of two years. One half of the council are chosen each spring. The mayor presides over the council.

The mayor is the administrative head of the city. He is chosen by popular election, also for a term of two years. He has the veto power over all acts of the council, and exerts directive control over the administrative departments. The mayor appoints the heads of departments, subject to the approval of the council. Heads of departments appoint their subordinates, subject to the approval of the mayor. The city treasurer, city clerk, and city attorney are elected by the people. The main administrative departments are those of finance, law, public works, police, fire, health, and education. The departments of health and education are under boards. The others have a single head.

The city budget is made annually by the common council, and the same body levies a tax to meet a great part of the expenses. Water rates provide the cost of water supply, and there is a considerable income from licenses. The sanitary board and the three park boards are permitted by law to levy taxes for their own purposes.

The board of education forms, strictly speaking, a department of the city government. The 21 members are appointed by the mayor, subject to the approval of the common council. Seven are appointed each year for a term of three years. The board, with the common council, levies an annual tax on city property. Such tax may not exceed two per cent on the assessed value of property. The city school tax for the year 1902 yielded $7,397,860.60. Besides this the city school fund received during the same year $331,833.86 from the State, $512,596.41 from interest on investments, and $82,455.94 from miscellaneous sources. The total income of the school board for 1892 amounted to $8,395,791.06.

The public schools offer free education through all grades up to and through the high schools, and the law makes elementary education compulsory. There are 15 high schools, with 356 teachers and an enrollment of 10,920 pupils. There are 235 elementary schools, with 5,021 teachers and 257,472 pupils. Students finishing the high school course are prepared to enter college. There is also a city normal school, with 74 teachers and 521 students, and there are 327 special teachers. The grounds, buildings, and equipments of the schools represent an investment of $34,474,311.33.

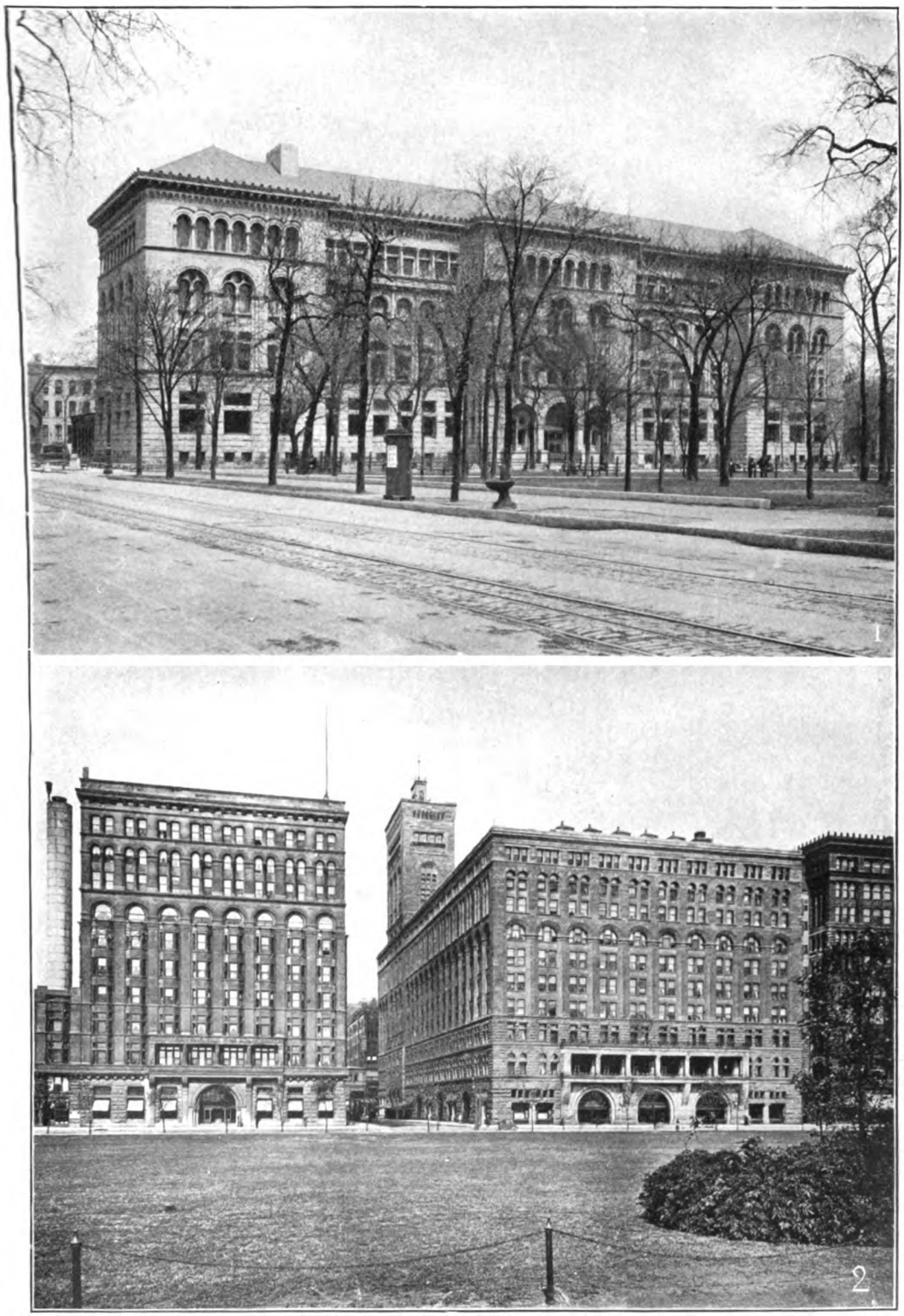
The Park System.— The parks of Chicago are under control of three boards, one for each of the three sections of the city. These boards are created under State law, and they are independent of the city government. The members of the Lincoln Park Board, on the North Side, and those of the West Park Board, are appointed by the governor of the State. The members of the South Park Board are appointed by the judges within Cook County. Each park board levies taxes on the property within its park district. The park system forms a girdle around the city, from Lincoln Park, on the lake shore at the north, to Jackson Park, on the lake shore at the south. The various parks are connected by a series of boulevards. The total area of parks and boulevards is 2,111.494 acres (1902). On the lake front between Randolph and Twelfth streets a park is being formed by filling in the submerged land to a distance of 1,200 feet from the existing shore line. This will result in a lakeside park of 203 acres, which is to contain the Field Columbian Museum, as well as the Art Gallery of the Chicago Art Institute. The shore line of this park will be a mile and a quarter. Funds for the parks are obtained by taxes levied by the boards on their respective districts, and by the sale of a limited amount of bonds. By a statute of 1903 park loans to the amount of $5,000,000 were authorized, and in consequence the total park area will presently be doubled.

The Chicago Sanitary District.— The Chicago Sanitary District was authorized by act of the State legislature in 1889, ratified by vote of the people in the same year, and organized in 1890. The water supply of the city is taken from the lake, being pumped into the mains from a series of stations at varying distances from the shore. The city drainage also was of necessity carried into the lake, either directly or by way of the river. Contamination of the water supply it was hoped to avoid by carrying the pumping stations farther into the lake than it was supposed the sewage outflow would go without purification by air and sun. As the city grew, however, it became manifest that the lake water was dangerous to health, and in the end the plan was devised of cutting a canal between the south branch of the Chicago River and the Desplaines River, with a pumping plant capable of turning the water of the south branch into the canal. Then, by connecting all the sewers with the river, it was intended to convert the city drainage into the Desplaines. As all parts of the city could not be included in the new drainage area, and also as a great part of that area must be outside the city limits, a drainage district was created, known as the Chicago Sanitary District. The construction and management of the canal within that district was entrusted to a board of nine commissioners, elected by the people. Funds were provided by bonds of the district and by taxation. The bonds amount to $14,005,000. The total cost of the work has been nearly $40,000,000. Earth was broken 3 Sept. 1892, and the water of the lake was turned into the canal 2 Jan. 1900. Since that date it may be noted that the Chicago River no longer flows into Lake Michigan. Its waters now reach the Mississippi. The Sanitary District as originally created comprised all of Chicago north of Eighty-seventh Street, and some 43 square miles of Cook County outside of Chicago. The assessed value of taxable property in the district is $393,080,042, of which $387,204,282 belong to that portion within the city — a percentage of 98.5. By law the board was authorized to effect loans to the amount of five per cent of the value of the taxable property in the district, provided that the total should not exceed $15,000,000. The tax levy of the district must not exceed one half of one per cent of the assessed value of taxable property in the district.

By a statute of 1903 large additions of territory will be made to the Sanitary District, so as to protect the lake water both north and south of the original area.

The main channel of the canal, from river to river, is 28.5 miles long. The width on the bottom varies from 110 feet to 202 feet, and on the top from 198 feet to 290 feet. The mini-

UofM



1. Newberry Library.

2. Auditorium and Annex.

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1. University of Chicago Buildings.

2. Lake Drive, Lincoln Park.

Mau

mum depth of water is 22 feet. It is evident that in the drainage canal is the beginning of a navigable waterway from Lake Michigan to the Mississippi River — including, indeed perhaps two thirds of the work and cost of such waterway.

Public Works.— The city department of public works has charge of the paving, repair, and cleaning of streets and alleys, of the construction and maintenance of sewers, and of the city waterworks. There were in the city 31 Dec. 1902, 2,798.34 miles of streets and 1,375 miles of alleys — a total of 4,173.34 miles. Of these 1,373.01 miles were paved. This is exclusive of the parkways and boulevards under the care of the various park boards, in which there are 101.250 miles of improved driveways. The total mileage of sewers, 1 Jan. 1903, was 1,527.05. Intercepting sewers are now under process of construction for the purpose of diverting the flow of sewage from the lake into the drainage canal.

The pumping stations provided the city during the year 1902 with 130,892,288,020 gallons of water. The mileage of water pipe in use was 1,918.74. Water rates were collected to the amount of $3,225,317.43 — an amount sufficient to cover the cost of the supply.

The City Library.— The Chicago Public Library contains 282,925 volumes. The main library building, on Michigan Avenue between Randolph and Washington streets, is valued at $2,055,550. The income of the Library Board (the members of which are appointed by the mayor), was for 1902, $284,098.08. Of this sum $273,696.69 were derived from taxation, and the remainder from miscellaneous sources. The library maintains branch reading rooms and delivery stations in different parts of the city. The T. B. Blackstone Memorial Branch Library, an Ionic building of granite and marble, with shelving capacity for 25,000 books, is nearing completion, the gift to the city of Mrs. T. B. Blackstone.

The City Corporate.— The city corporate, that is, the city exclusive of the Sanitary and Park corporations and the school board, had a total public revenue for 1902 of $11,055,391.78. Of this sum $5,770,876.97 were derived from taxation, $3,770,735.37 from licenses. The public debt of the city corporate was 31 Dec. 1902, $15,123,000. There were also at that time outstanding water certificates to the amount of $1,000,000.

Institutions of Private Endowment.— The public spirit of Chicago citizens is manifest in many institutions endowed by private munificence for the public good.

The Chicago Art Institute is devoted to maintaining an art gallery and to conducting education in art and architecture. The enrollment of students for 1902–3 was 2,580. The Ryerson Library of Art, a beautiful wing of the main building, contains about 3,000 volumes.

The Newberry Library, on the North Side, has an endowment of $2,500,000, and occupies a building valued at $500,000. The library, used wholly for consultation, has 260,773 books and pamphlets.

The John Crerar Library, on the South Side, has an endowment of $3,400,000. The books, which are confined to branches of science, number 89,210.

The library of the Chicago Law Institute, which has quarters in the County Court-house, numbers 39,830 volumes.

The library of the University of Chicago contains 365,000 volumes.

Higher education is represented by the University of Chicago, by the professional schools of Northwestern University, by the medical schools of the University of Illinois, by the Armour Institute and the Lewis Institute, and by various independent schools of law and medicine.

The University of Chicago (q.v.) opened its doors for instruction in 1892. The buildings are situated on the South Side, fronting on the Midway Plaisance, one of the south parkways. Its assets amount to $17,348,000. The enrollment of students in 1902–3 numbered 4,463. The university consists of colleges of arts, literature, and science, a divinity school, a law school, a medical school, a professional school for teachers, and of various other activities, including a press department, which publishes both books and periodicals.

Northwestern University maintains in the city its schools of law, medicine, pharmacy, and dentistry. The college of liberal arts and the school of music are at Evanston. The entire endowment of the university, including grounds and buildings, amounts to $6,000,000. The total number of students in all departments (1902–3) was 2,731.

The University of Illinois (located at Urbana, Champaign County) has its schools of medicine, dentistry, and pharmacy in Chicago. There were in 1902–3 in these schools 1,039 students.

The Lewis Institute is a polytechnic school, on the West Side. It was opened for instruction in 1895, the endowment at that time amounting to $1,600,000. The enrollment of students for 1902–3 included 1,143 in the day classes and 1,362 in the night classes.

The Armour Institute, on the South Side, is also a polytechnic school. The endowment amounts to $4,500,000, and the enrollment of students, 1902–3, was 1,300.

The Field Columbian Museum (q.v.) is an outcome of the Exposition of 1893. The museum was incorporated in that year, and was at the outset enriched by many of the most valuable exhibits which had been made at the Exposition. The original endowment of $1,250,000 was the gift in large part of one citizen. Large acquisitions have been made, especially in the fields of American ethnology. The collections are at present housed in one of the remaining Exposition buildings, in Jackson Park. Plans are on foot for more adequate provision in the near future. In 1900–1 there were 4,196 students enrolled in the schools of law, medicine, and theology situated in Chicago.

There are 52 hospitals in the city, including the Cook County hospital. Many of these are liberally endowed. There are also 33 free medical dispensaries, 59 asylums, including the Cook County Insane Asylum and the county poor-house, both of which are situated at Dunning, outside the city limits.

Churches.— Religious organizations number some 919 churches and missions. Of these the most numerous are the 70 churches and 14 missions of the Baptists, the 79 churches and 20 missions of the Congregationalists, the 47 churches and 6 missions of the Episcopalians,

the 34 Jewish congregations, the 93 Methodist Episcopal, 69 Lutheran, 56 German Protestant, and 135 Roman Catholic.

Business.— Manufactures and commerce form the basis of Chicago's prosperity. With the development of the West and the extension of railroads the industries of the city have grown to enormous magnitude. The manufactures of iron and steel in South Chicago, the agricultural implement works, and the beef and pork packing, are among the largest. The receipts of live cattle at the Union Stock Yards in 1902 were 2,941,559, of sheep 4,515,716, and of hogs 7,895,238. By far the greater part of these were either consumed in the city or packed and sold abroad. The Chicago elevator warehouses have a capacity of 30,470,000 bushels of grain. The total clearings of the associated banks of Chicago for 1902 were $8,394,872,351.59, and the total balances were $653,199,396.54. The national banks in the city had (25 Nov. 1902) a total capital stock of $24,900,000, and total deposits of $265,136,636. State banks showed (22 Dec. 1902) total deposits of $215,413,008.

The census of 1900 records 19,203 manufacturing establishments. Chicago, with a capital of $534,000,689, an average number of 262,621 wage earners, total wages amounting to $131,065,337, and a product valued at $888,945,311. New York by the same census shows 39,776 establishments, with a capital of $921,876,081, and a product of $1,371,358,468. The third manufacturing city in the Union is Philadelphia, with 15,887 establishments, a capital of $476,529,407, and a product valued at $603,466,526.

Bibliography.— Moses, 'Illinois, Historical and Statistical'; Andreas, 'History of Chicago'; Blanchard, 'History of Illinois and Chicago'; Moses and Kirkland, 'History of Chicago'; 'Annual Report of Trade and Commerce: Board of Trade, 1902'; City of Chicago Quarterly Statistics; Comptroller's Annual Report, 1902; Report of the South Park Commissioners, 1902; Report of the Lincoln Park Commissioners, 1902; Report of the West Park Commissioners, 1902; Daily News Almanac, 1902; annual reports of various institutions.

HARRY PRATT JUDSON.

Chicago, The, a ship of the U. S. navy, launched 5 Dec. 1885; put out of commission 1 May 1895; remodeled and made into a protected cruiser in 1898. The Chicago was used as a flagship by Admiral John G. Walker until 1895, and visited many foreign countries, among them the shores of the Mediterranean, Brazil, the Argentine Republic, Venezuela, and the principal European ports. The ship originally could make but 14 knots an hour; but with her new engines has increased her speed 5 knots an hour. Her new battery consists of four 8-inch rifles, and 14 rapid-fire 5-inch rifles, with a secondary force of seven 6-pounders, two 1-pounders, two Colts, and one 3-inch field-piece. In time of war the Chicago is intended to serve as a scout, a commerce-destroyer, and a blockader. In 1900–1 she was the flagship of Rear-Admiral Schley's South Atlantic squadron.

Chicago Drainage Canal, a canal intended chiefly for carrying off the sewage of Chicago, but which may be used for commercial purposes. It was begun in September 1892, and was completed in January 1900. The main channel is 29 miles long, extending from Chicago to Lockport on the Illinois River, into which stream it discharges. The cost of the canal was about $45,000,000. See CANALS.

Chicago Summer School. See SUMMER SCHOOLS.

Chicago University. See UNIVERSITY OF CHICAGO.

Chichen, chĭ-chān', or **Chichen-Itza,** ē-tzā', Mexico, an ancient ruined city of Yucatan, 18 miles southwest of Valladolid. Its magnificent ruins have a greater appearance of antiquity and are in better preservation than most of the other ruined cities of the same province, which has received much attention from archæologists on account of its remains of a little known people in a state of considerable civilization. Here have been studied the most interesting and important remains of the Mayan tribe of Itza. Among the ruins of the ancient city is a pyramid 550 feet square at the base; a vast building, supposed to be a temple, with bas-reliefs; houses containing sculptured chambers; and many other structures of archæological interest.

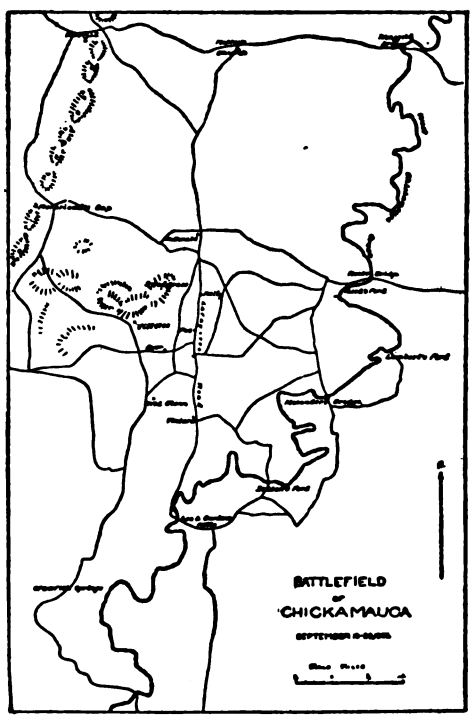
Chichester, chich'ĕs-tẽr, England, a municipal borough and episcopal city, near the southwest corner of the county of Sussex. It is well built and has wide streets. Its old wall, still in good preservation and lined with lofty elms, gives it a very picturesque appearance. Its principal edifice is the cathedral, an ancient Gothic structure, with one of the most graceful spires in England, and containing among many monuments one of the poet Collins, who was born and died here. The fine old octagonal market-cross should also be mentioned. Pop. (1901) 12,241.

Chick-pea, the popular name of *Cicer arietinum* and other plants of the same genus, growing wild along the shores of the Mediterranean and in many parts of the East, and producing a short puffy pod with one or generally two small wrinkled seeds. It is an important article of French and Spanish cookery, and the plant is cultivated in Europe, Egypt, Syria, India, Mexico, etc. When roasted it is the common parched pulse of the East. It is sometimes used as a substitute for, or as an adulterant of coffee. The herbage serves as fodder for cattle. The chick-peas are leguminous plants of the vetch tribe, differing from the vetches mainly in the fruit. Seven species are known, having the flowers solitary or in small axillary groups.

Chick'-a-dee (an onomatopoeic word, imitating the note of the bird), a local name for the black-cap titmouse. See TITMOUSE.

Chickahom'iny, a river in Virginia, about 75 miles in length. It is an affluent of the James and runs parallel to it for many miles from its source northwest of Richmond. As its course was between the Union armies and Richmond, on and near it occurred many of the most important events of McClellan's Peninsula campaign in 1862, including the battles of Williamsburg, Hanover Court-House, Fair Oaks, Mechanicsville, Cold Harbor, Savage's Station, Frazier's Farm, and Malvern Hill (qq.v.). The second battle of Cold Harbor under Grant occurred 3 June 1864.

Chickamauga, chīk-a-mâ'ga, Battle of, fought near Chickamauga Creek, and on Georgia soil, 19–20 Sept. 1863. Gen. Rosecrans (q.v.) having forced Bragg (q.v.) out of his fortified position in Middle Tennessee by a campaign of strategy, prepared to gain possession of Chattanooga, the gateway through the mountains to the Gulf States, and a most important railroad centre for the Confederacy. Bragg held the city, which was beyond the Cumberland Mountains and the Tennessee River. Rosecrans' army lay along the western base of the Cumberlands. His headquarters were at Winchester, Tenn. His army was composed of three corps of infantry, the Fourteenth, Gen. George H. Thomas; the Twentieth, Gen. Alex. McD. McCook; and the Twenty-first, Gen. Thomas L. Crittenden. Gen. D. S. Stanley commanded the one corps of cavalry. McCook's corps was the right wing, Thomas'



the centre, and Crittenden's the left. Stanley's cavalry guarded the right flank, and Minty's brigade of cavalry the left.

The plan of campaign involved the repair of the railroad to the Tennessee River, the collection of supplies for a month's absence from any base, and ammunition for two battles. It also included throwing Rosecrans' army to the rear of Chattanooga and advancing to it from the south. His centre and right were ascending Lookout before Bragg became aware of the character of the movement. He then evacuated Chattanooga and moved to La Fayette, 26 miles south and behind Pigeon Mountain, the next range east of Lookout, leaving his rear-guard just below Lee and Gordon's Mill at the crossing of the Chickamauga. Crittenden having accomplished his purpose north of the Tennessee, withdrew through Sequatchee Valley to the river, crossed both that and the Sand Mountains, and entered Lookout Valley near the north point of Lookout Mountain. A reconnoitering party, 9 September, discovered the evacuation of the city. Passing around the point of the mountain, Crittenden, leaving one brigade in the city, proceeded at once by way of Rossville Gap to operate to the left of Thomas, who had descended Lookout at Stevens' Gap. McCook was further to the right, having crossed Lookout at Winston's. The grand strategy of the campaign had been entirely successful. The army had been thrown over three formidable mountain ranges and a wide river, all within the immediate territory of Gen. Bragg, without opposition, almost without discovery, and entirely without loss. To possess Chattanooga it remained necessary to concentrate the widely separated corps in it, or between it and Bragg.

Erroneous dispatches led Rosecrans to believe that Bragg was retreating on Rome. He ordered pursuit, and found Bragg occupying the gaps in Pigeon Mountain in force and preparing movements against each separate corps. These failed, and Bragg, having notice of the arrival of Longstreet, with two divisions from the Army of Northern Virginia, issued, 18 September, orders of battle designed for interposing between the Union army and the city. At this time the main bodies of the two armies confronted each other across the upper Chickamauga, and Longstreet was arriving at Ringgold. Crittenden's corps was concentrated at Lee and Gordon's mill.

During the afternoon of the 18th Gen. Bushrod Johnson from Ringgold, in command of five brigades, including Hood's division of Longstreet's corps, forced a crossing at Reed's Bridge, after a sharp defense by Minty's cavalry. Walker's corps, after failing at Alexander's Bridge, which was defended by Wilder's brigade of mounted infantry, crossed at a ford below. During the night about two thirds of Bragg's army crossed the Chickamauga, and early in the morning of the 19th he formed line of battle directly on Crittenden's left flank and in near contact with it. Bragg's plan was to drive Crittenden's corps back on Thomas in the centre, and both on McCook at the right, and force the whole into the mountains. His plan of battle was interfered with and finally destroyed by an undiscovered night advance of Rosecrans' centre and right, by which he passed several miles beyond Bragg's position and thrust his lines across the La Fayette road and eastward to the Chickamauga, and so gained position between Bragg and Chattanooga. The head of Thomas' corps, which struck Forrest's cavalry at Jay's Mill, was Brannan's division. The fighting became desperate ,and at close quarters, and so continued until 1 o'clock, when Forrest and his supports were repulsed. Soon both armies were rapidly advancing toward this vortex of fierce fighting. It was of desperate character on both sides, continuing from noon until sunset, with alternate success and repulse for each side, the field finally remaining in possession of the Union forces. The deadly fighting throughout the day had been largely in forests thick with underbrush, and so all within the limits of point-blank range. At nightfall Cleburne's division burst with great force upon the lines of

Johnson's and Baird's divisions, which were well in advance at the centre. They gradually withdrew from under the fire which continued for an hour after dark. At the close of the fighting for the day Rosecrans' army held the La Fayette road between Bragg and Chattanooga, and Bragg's plan of battle for the day had been effectually defeated.

On the Union side the entire force except five brigades had been engaged. Of Bragg's army three divisions and one brigade present had not been engaged, and two brigades did not arrive until the second day. At the close of the first day's battle the Confederate line extended from Hall's Ford to Jay's Mill. The Union line was brought back nearer to the La Fayette road, which was the axis and the objective of the battle. The Confederate line extended far beyond the Union left. Counting by brigades, the Union line was overlapped on its left by four brigades of cavalry, two fighting dismounted, and two brigades of infantry, and on its right by two brigades of infantry. The Confederates had 15 brigades in their reserves, counting Longstreet's second and third lines, Law's and Kershaw's divisions, at the centre. The Union army had five, an overlapping force for the Confederates of four brigades, and an excess of 10 in the reserves. The Union line had strengthened its front by logs, stumps, stones, and fence rails. Counting by divisions from left to right, it was formed as follows: Baird, Johnson, Palmer, and Reynolds east of the La Fayette road; Brannan, Negley, Davis, Sheridan, and Wilder's Mounted Brigade west of it, with Wood and Van Cleve in reserve. The Confederate line, from right to left, was thus composed: Pegram and Armstrong of Forrest's cavalry, Breckenridge, Cleburne, Stewart, Bushrod Johnson, Hindman, Preston, with Walker, Liddell, Cheatham, Law, and Kershaw in reserve.

The Confederates attacked about 9 o'clock, Breckinridge moving against Baird, the left brigade, striking Baird's rude works, being broken on them and its commander being mortally wounded. The other two brigades swung around full in the Union rear, but were driven back after sharp fighting. Cleburne and Stewart assaulted in succession and were both repulsed. At 11 o'clock Negley, in rear of the Brotherton house, had been replaced by Wood from the reserve, and sent to the left. Brannan, on the left of Wood, had also been ordered to the left, but the Confederate attack developing on his front, he did not move. Upon the supposition that he had gone, Wood was ordered to close on Reynolds, the next division to the left of Brannan. Wood moved promptly to find Reynolds. This left a gap, just as Longstreet, with a column of three divisions, Bushrod Johnson in the front line, Law in the second, and Kershaw in the third, was moving to attack Wood's position. This broke the Union centre. Davis' and Sheridan's divisions to the right of the break were rushed toward the gap, but failed to restore the line, and being attacked in front and on both flanks by Johnson's and Hindman's troops were forced off the field in confusion. Rosecrans, Crittenden, and McCook, being with the right wing, were driven off the field with that portion of the army which left it. Brannan's division, the first on the left of the break, swung back nearly at right angles, and took position on Snodgrass Hill, a quarter of a mile in the rear, on which also rallied other portions of the Union army that had been scattered or broken. At noon Forrest's cavalry, opposite Cloud's, had crossed the La Fayette road and captured the field hospitals of the Union left wing.

The four divisions of Baird, Johnson, Palmer, and Reynolds maintained their lines around the Kelly field. At 1 o'clock Gen. Thomas had formed parts of Brannan's, Wood's, and Negley's divisions, with various fragments, on Snodgrass Hill. Negley had left at noon with two regiments of infantry and 40 guns. Gen. Thomas then found himself with only one battery. About 1:30 the hill was assaulted by five brigades, that of Fulton overlapping Brannan's right and gaining the valley in his rear. At this juncture Gordon Granger arrived from McAfee's Church with Whitaker and Mitchell's brigades of Steedman's division, and promptly attacking, drove the Confederate force which had crossed the ridge over it again, and extended Gen. Thomas' line for a half mile along the crest. About the same time Van Derveer's strong brigade arrived from its successful charge on Breckenridge in the Kelly field and strengthened Brannan's line. Longstreet's assault continued with little intermission until sundown, all being of the most courageous character. Finally 11 Confederate brigades were participating in the attack on Snodgrass. For its defense Thomas at the last had five brigades and about one half of two others. There was little fighting on the Kelly field line after 1 o'clock, though Bragg ordered a general attack for 3. It was not delivered until about sundown. At 3 Longstreet, from Snodgrass Hill, asked Bragg for re-enforcements, but was informed that the right wing had been so beaten back that it could be of no service to him. Longstreet's last assault was with troops that had not been engaged. Their attack began at 4:30 and lasted until 6. They gained a salient of the Union line and held it for an hour, with a loss of 36 per cent, but were finally dislodged by Gen. Charles H. Grosvenor's regiment.

At 5.30 Gen. Thomas began withdrawing his army. The four divisions on the Kelly field retired in succession from right to left. Reynolds and Palmer were not attacked. The Confederate attack ordered for 3 o'clock was delivered just as Johnson and Baird were leaving their lines, and some captures were made, though both reached the forest west of the La Fayette road without disorganization, and followed the rest of the left wing through McFarland's Gap to Rossville. At 7 o'clock the Snodgrass Hill line began to retire from left to right. Steedman's withdrew at 6, sundown. Fighting in his front had ceased. An hour later Trigg and Kelly, passing over the ground which Steedman had occupied, captured the greater part of three Union regiments which were temporarily attached to the left of his line, and by mistake had not received notice of the withdrawal. The last volley of the battle was fired by troops of Van Derveer's brigade at Kelly's and Trigg's lines, which, after capturing the isolated troops, attempted to move on Van Derveer's position. Davis' division, which had been cut off at noon, reached a point on its return near Gen. Thomas' right at sundown.

Gen. Sheridan, who had continued to Rossville, marched toward the field from that point, reaching Cloud's an hour after sundown. Both of these divisions acted as supports for the flanks, while the troops were being withdrawn. Gen. Thomas withdrew the army without molestation through McFarland's Gap to Rossville, and during the night placed it in strong position in the gap at Rossville, along the adjacent crests of Missionary Ridge, and across the valley to Lookout Mountain. It was thus firmly established between Bragg and Chattanooga. Holding his lines through the next day, at night he withdrew toward Chattanooga.

Gen. Rosecrans crossed the Tennessee with an effective force of a little above 55,000. Two brigades and an additional regiment were detached. A maximum figure for his force at the opening of the battle would be 50,000. It is difficult to approximate Bragg's force. A week after the battle he reported 38,846 effectives, and his losses to have been 18,000, which would make his force in action 56,846. Gen. R. E. Lee, writing to President Davis of Bragg's strength, five days before the battle, said: «His total effective force will therefore be 76,219, as large a number as I suppose he can operate with.» This was counting Longstreet's re-enforcement, according to Gen. Lee's figures, but a large part of Longstreet's forces never reached Bragg. In view of Gen. Lee's statements, and the known overlapping of the Union lines, and the preponderance of his reserves, it would seem that Bragg's force can be fairly fixed at 55,000.

Few, if any, of the great battles of the war show an equal percentage of casualties, considering the numbers engaged and the time of fighting. The losses for killed and wounded and missing for Rosecrans were 16,179, and for Bragg 18,000. For the troops actually engaged these figures give a percentage of 33 per cent for each side. On the Confederate side, Longstreet's wing lost 44 per cent, nearly all on the second day. Bushrod Johnson's division lost 44 per cent, and Preston's 33 per cent in the attack of an hour and a half on Snodgrass Hill; and Gracie's brigade of the latter division lost 36 per cent during the same time. The brigade losses in Cheatham's division ranged from 35 to 50 per cent. The loss in Breckinridge's division was 33 per cent, and in Cleburne's 43 per cent. Bates' brigade of Stewart's division lost 52 per cent. The Confederates assaulted throughout the second day.

On the Union side Steedman's division lost 49 per cent in four hours, and all of these were killed or wounded but one. Brannan's division lost slightly over 36 per cent; Van Derveer's brigade of that division only two less than 50 per cent; Davis' division a little over 50 per cent; Van Cleve's division 23.5 per cent. Among the Union brigades Buell's loss was 45 per cent, Carlin's 53 per cent, Hazen's 34 per cent, Dick's 25 per cent, Connell's 37 per cent, and Croxton's 39 per cent.

On 22 September Bragg began to establish his lines before Chattanooga and prepare for either driving or starving the Union army out of it. Consult 'War of the Rebellion Records,' Vol. 23, parts 1 and 2; Vol. 30, parts 1, 2, 3, and 4.

H. V. BOYNTON.

Chickamauga National Military Park. Congress, in 1890, passed an act authorizing the establishment of a park on the site of the battle of Chickamauga. In carrying out the project the States of Georgia and Tennessee co-operated with the commission appointed by Congress. To the United States Federal government the citizens of each State sold and the States ceded jurisdiction over lands and roads included in or leading to the battle-field of Chickamauga, as well as the sites of those actions which took place about Chattanooga, and which the park also commemorates. The actual area of the park is 11 square miles, but to all intents and purposes it embraces a much larger tract. It was dedicated with elaborate ceremonies 19–21 Sept. 1895, and already it has been greatly beautified, and markers, monuments, etc., furnishing explanations of the field, have been erected. See BOYNTON, HENRY V.

Chick'aree, the American red squirrel; a popular name, imitative of its cry. See SQUIRREL.

Chickasaw Bayou, or Bluffs, Battle of. On 8 Dec. 1862 Gen. Grant ordered Gen. W. T. Sherman to organize at Memphis, Tenn., an expedition which, in co-operation with Admiral D. D. Porter's gunboat fleet, should reduce Vicksburg. On the 22d the expedition rendezvoused at Friar's Point on the Mississippi, ready to move up the Yazoo River in rear of Vicksburg. Sherman had the four divisions of Gens. F. Steele, Geo. W. Morgan, M. L. Smith, and A. J. Smith, aggregating about 30,000 men. The transports, preceded by the gunboats, entered Yazoo River on the 25th, and on the 26th and 27th the troops were landed on its south bank, confronting the bluffs overlooking the swamps through which ran Chickasaw Bayou. Gen. J. C. Pemberton, commanding the Confederate forces in Mississippi, was at Grenada opposing Grant, who was moving south from Grand Junction and Corinth on the line of the railroads. On the 21st Pemberton heard that the fleet and transports were moving down the Mississippi for the supposed purpose of attacking Vicksburg, which at the time was held by Gen. Martin L. Smith with the brigade of Gen. S. D. Lee. Vaughn's brigade was immediately ordered to Vicksburg, and was soon followed by the brigades of Gregg and Barton. Pemberton arrived at Vicksburg on the 26th and the last of the three brigades during the night of the 27th. Pemberton disposed his forces, Vaughn, Gregg, Barton, and Lee, on a line from Vicksburg on the left to Haynes' Bluff on the right, a distance of 13 miles, on high ground overlooking Chickasaw Bayou and the Yazoo River, S. D. Lee holding Walnut Hills from Vicksburg to Snyder's Mill on the right, a distance of 10 miles. Lee was a good engineer and a fine officer; he strengthened his position by works for his batteries and rifle-pits on the slope of the bluff, which rose to an elevation of about 200 feet above the bayou. Between this position and where Sherman had landed was bottom land, almost wholly densely wooded, intersected with bayous and low, swampy ground. There were but three roads through this area, and these were obstructed by earthworks and felled timber. By these roads Sherman advanced on the morning of the 27th, Steele on the left, Morgan on the right of Steele, and

M. L. Smith and A. J. Smith on the right of Morgan. There was heavy skirmishing on the 27th and 28th, the Confederate outposts were driven in, and at night of the 28th the Union troops lay parallel to Chickasaw or Walnut Hills bluff and about 600 yards from its foot. The main assault on the bluff was to be made by Morgan, supported by Steele; while, to make a diversion in favor of Morgan, A. J. Smith, with M. L. Smith's division and one brigade of his own, was to cross a lake, a mile below Morgan, by a narrow sand-bar, and attack. On the extreme right the rest of A. J. Smith's division was to demonstrate on the road to Vicksburg. On the morning of the 29th Morgan represented to Sherman that an attack from his position was impracticable; but Sherman, after an examination, made no change in his disposition, and rode off to his headquarters, whence he sent his adjutant-general to Morgan with this message: "Tell Morgan to give the signal for assault; that we will lose 5,000 men before we take Vicksburg, and may as well lose them here as anywhere else." Morgan replied that Sherman's entire army could not carry the position in his front, but that he would order the assault. De Courcy's brigade of Morgan's division, and the two brigades of Blair and Thayer of Steele's, were formed for the assault. The signal was given by a heavy artillery fire upon the Confederate lines, and at 12 o'clock the three brigades went forward. By some misunderstanding Thayer's brigade, with the exception of the 4th Iowa, diverged too far to the right, but De Courcy, Blair, and Thayer (with the 4th Iowa), about 6,000 men, after clearing the obstruction in front and floundering through deep mire and tangled marsh, under a terrific fire of artillery, finally made a lodgment on the hard table-land at the foot of the bluff, where an abandoned line of works gave shelter, and where some of the men stopped. All formation was broken up, brigades and regiments mixed, but on went the main body, pushed up the bluff, and reached different points of Lee's works, but were met on both flanks by such a withering fire from the rifle-pits that ran diagonally up the slope of the hill, and so severe a cross-fire of shell and canister from the batteries, that the men faltered and, no support being in sight, fell back to the point of starting, leaving about 1,500 killed, wounded, and captured. Lee lost 115. More to the right, where A. J. Smith was to demonstrate, the 6th Missouri gained the levee at the foot of the bluff, but not able to go farther under the hot fire poured upon them from above, the men sought shelter by digging with hands and bayonets into the bank of the levee, where they remained until night covered their withdrawal, after a loss of 57 killed and wounded. Sherman thought of renewing the assault in the morning, but after a personal examination he came to the conclusion that the enemy's centre could not be broken without crippling his army beyond the power to act with any vigor afterward, and proposed to attack Haynes' Bluff, higher up the Yazoo. Preparations were made to assault at 4 o'clock on the morning of 1 Jan. 1863. Admiral Porter, who was to co-operate in this attack, found the fog so dense on the river that he could not move his boats. The attack was deferred and then abandoned, and by sunrise, 2 January, the troops were all re-embarked on transports and sailed for Milliken's Bend. The Union loss in the assault on Chickasaw Bluffs and in the skirmishing preceding it was 1,213 killed and wounded, and 563 missing. The Confederate loss was 177 killed and wounded, and 10 missing. Consult: 'Official Records,' Vol. XVII.; The Century Company's 'Battles and Leaders of the Civil War,' Vol. III.; F. V. Greene, 'The Mississippi.'

E. A. CARMAN.

Chickasaw, chĭk'ạ-sâ, the most active and warlike tribe of the great Muskhogean (q.v.) Indian stock; a branch of the Choctaw (q.v.), and according to their own tradition, not separated till after the united tribe crossed the Mississippi eastward. They occupied northeastern Mississippi, and the adjacent part of western Tennessee to the Ohio. Their chief settlements were on the head-waters of the Tombigbee and Yazoo, about the present Pontotoc and Chickasaw counties, and a trail led to them from the site of Memphis, 160 miles off, their principal Mississippi landing. They were first found by De Soto, who reached the village of "Chicaça." with 200 houses, on the west bank of the Yazoo, 17 Dec. 1540, and remained there till March; but when he undertook to impress some of the Indians as porters, he was repeatedly assailed, the village fired, his path barred by a stockade, and he lost many men before he beat them off. English traders penetrated thither in the 17th century. After the French settlement at Mobile, the rivalry of the two nations first set them against the French, and for a time cut off the Mississippi trade from both; but with the French, as the only real colonists in that region, they were in constant and envenomed hostility for many years, and Bienville and D'Artaguette led expeditions against them again and again, not even a nominal peace in 1740 putting an end to their warfare. With Oglethorpe of Georgia they had friendly relations. At this time they had four large contiguous settlements, with the houses in each scattered over a space 1 to 2 miles wide and 4 to 10 long; the chief was called Chookka Pharaah, or Long House. Their sachem was called the *mico*. In 1765 Gov. Johnstone of west Florida induced them and the Choctaws to hold a council with him at Mobile, where a trade tariff was framed; but the white traders among them soon precipitated fresh troubles. After the Revolution, at the great general treaty of Hopewell, 28 Nov. 1785, their *mico* Pio and others made a treaty delimiting their lands from the Ohio River to the Mississippi State line. Their number was then estimated at 800 to 1,200. The reliability of these estimates may be judged from the fact that they are said to have had 10,000 warriors when they crossed the Mississippi, 450 in 1755, 750 in 1764, and 500 in 1768. In 1793 they joined the whites against the Creeks, and continued friendly to the settlers. In 1805, 1816, and 1818, they gradually ceded all lands north of the Mississippi line. About 1800, as the hunting grounds narrowed, the tribe began to migrate west of the Mississippi, as did the Cherokees and others. In 1822 there were in Mississippi 3,625 on a reliable count, with eight towns, and a progressive civilization: they were industrious farmers and cattle-men, marketing live stock among the whites. By the treaty of Pontotoc Creek, 20 Oct. 1822, they made another large cession of

lands; and by that of Washington, 24 May 1834, they gave up all the remainder, the two cessions comprising 6,442,400 acres, or over 10,000 square miles, for which they received $3,646,000. On 17 Jan. 1837 they bought of the Choctaws for $530,000 a district on the Red River west and south of the Washita (the extreme western part of the present Indian Territory), to be inalienable except with the consent of the Choctaws; relinquished their governmental organization, and became a part of that nation, with proportionate representation in its government. A considerable number, instead of remaining with the tribe, scattered through the Choctaws, buying and taking up lands at pleasure. They lagged behind the Choctaws in progress, however; a smallpox epidemic carried off several hundred; the government annuity made them lazy; and they opened no schools till 1851. Aggrieved at being represented in the Choctaw government only according to numbers, instead of equally as a tribe, they appealed to the President, and on 27 June 1855 were given separate title to their district as the Chickasaw Nation. They organized a government with a council and two-chambered legislature, and advanced rapidly. In the Civil War, as slaveholders, and having southern agents, they joined the Confederate side; lost about one fourth of their people, and were liable to the penalties of treason. By the treaty of Fort Smith, September 1865 they were conditionally restored to their rights. On 28 April 1866 all the old treaties were renewed; but they were forced to sell to the government 7,000,000 acres of land, nearly 11,000 square miles, for $315,000, the money to go to their former slaves unless they admitted them to full tribal citizenship. They held off for some years, but finally acceded on 10 Jan. 1873. The "nation" in 1900 numbered 5,872, of whom probably two thirds were Chickasaws proper, and they are increasing.

Chicken. See FOWL.

Chicken-flea, the common name of *Sarcopsylla gallinacea,* a pest of young chickens in tropical and subtropical regions, and destructive from Florida to Texas. It is smaller and shorter than the cat flea, with the eyes and antennæ in the hinder part of the head, and it does not hop. It abounds mostly in shady places, under old houses, and in earthen floors. It is first observed to infest young chickens and turkeys, and by its number and pertinacity kills young chickens, while being more or less permanently parasites on hens. Consult: Packard, 'Insect Life,' Vol. VII.

Chicken-lice, several species of bird-lice (*Mallophaga*), or louse-like wingless insects, afflicting chickens and hens. Unlike the louse (*Pediculus*), which obtains its nourishment by suction, the bird-lice have free jaws adapted for cutting feathers, though they also draw blood from the skin of their host. The large chicken louse (*Goniocotes abdominalis*) is less common than the lesser chicken-louse (*G. hologaster*); it is only one millimetre long, while the first-named kind is three millimetres long. Quite a different kind is the common hen-louse (*Menopon pallidum*), which is the most abundant and annoying of all. It differs from the others in its light color and greater activity, running among the feathers and from them upon the hands of persons handling fowls. It is from one to one and a half millimetres long, rather slender, and of a pale straw-yellow color. Fowls should be allowed plenty of ashes and road dust in which to roll. An infested hennery should be well fumigated and whitewashed, and insect-powder should be dusted upon the birds themselves.

Chicken-mite, or **Poultry-tick,** a small mite (*Dermanyssus gallinæ*) which gathers on fowls at night and sucks their blood. It is about one millimeter high, light gray, with dark patches, but red when gorged with blood. It swarms in cracks and corners of the henhouse, and should not be confounded with the bird-tick (*D. avium*).

Chicken-pox, an acute, specific, infectious disease, characterized by a definite incubation period, an eruption of successive crops of vesicles which persist for a certain length of time, and a well-marked clinical course of short duration. It is one of the mildest of the eruptive fevers. The disease is usually epidemic, but sporadic cases do occur. It very frequently accompanies small-pox, and great care must be exercised not to confound mild cases of small-pox with severe cases of chicken-pox. The stage of incubation is usually about eight days, although it may vary from 8 to 18 days. The child may be feverish in some cases, have a slight chill, pain in the back and legs, nausea and vomiting. The eruption usually develops within 24 hours after the first onset. There are first raised red papules which in a few hours are transferred into raised hemispherical vesels filled with clear serum. At the end of 36 to 48 hours, this clear serum may become purulent, and the vesicles then begin to shrivel, and in from three to four days are changed to dark-brown crusts which fall off and rarely leave a scar. Fresh groups occur during the first two or three days of the illness; as a rule they are not very many in number. In delicate children the number may be large, and gangrene may set in unless great care is taken in the treatment of the vesicles. Chicken-pox is very contagious, but is not dangerous, and the first treatment should be the complete isolation of the patient.

Chicken-snake, a name given in the northern United States to the *Coluber eximius, C. quadrivittatus,* or *Ophibolus eximius.* The head is short and the snout rounded; the nostrils are lateral, the eyes large, with a dusky pupil and gray iris; the neck is contracted, the body long but robust, covered with smooth, small, hexagonal scales above, and broad plates below; the tail is short, thick, soon becoming cylindrical, and ending in a horny tip. The color is milky white above, sometimes tinged with red; along the vertebral line is a series of dusky oval spots bordered with black, sometimes giving the appearance of transverse white and black bands. Alternating with these bands on the sides is another series of smaller rounded and blacker spots, and sometimes a third smaller series lower down. The upper lip is milky white; the abdomen is silver white, sometimes yellowish, each plate marked with one or two black, quadrilateral spots, near the centre if single, and near the margins if double, giving a tessellated appearance. It grows to the length of five feet. It is perfectly harmless; from its frequenting houses and dairies it has been called "house

snake» and «milk snake.» It feeds on frogs, toads, mice, insects, and small birds. It does not appear to be found below lat. 37° N.; westward it extends to the Mississippi. It prefers shady and rocky places. The chicken snake of the south is *Scotophis quadrivittatus;* the body is very long; above, a greenish clay color, with four longitudinal brown bands; yellowish beneath; scales on the back ridged; and on the sides smooth; the head is quite distinct; the tail is one fifth the whole length; body three and a half feet, and tail 10 inches. It is said to attain a length of seven feet. It is found from North Carolina southward, and to the Mississippi; it destroys rats, young chickens, and small animals, but its bite is harmless to man. It is sometimes found on trees.

Chicken-tick, an arachnid of the family *Argasidæ,* and related to the mites, but very much larger. Originally an inhabitant of tropical America, this tick (*Argas miniatus*) has been found to annoy poultry in Texas and Florida. It is about a quarter of an inch long, usually very flat, unless gorged with blood. The surface of the body differs from that of other ticks in having scattered pits with a raised edge; it also differs from ordinary ticks in the head being covered by the body, in the spiracles being placed between the third and fourth pairs of legs, and in having no pulvillum between the claws. It was originally found in Texas among ordinary ticks taken from cattle. The young is six-footed. Of 10 other species of *Argas, A. reflexus* of the Old World lives on pigeons and occasionally attacks man; the Persian *Argas* (*A. persicus*) in Persia attacks man and poultry.

Chick'ering, Jonas, American piano maker: b. New Ipswich, N. H., 5 April 1797; d. Boston, Mass., 8 Dec. 1853. The son of a blacksmith, he received only a common school education, and in 1819 entered a piano manufactory in Boston, Mass., conducted by John Osborn, later going into business for himself. At that time the making of a piano was an event of sufficient importance to receive extended public mention, and the first instruments made by Chickering and his contemporaries were works of art. Before his death his Boston factory was turning out 2,000 pianos a year. The firm has been carried on continuously by his sons, and their pianos have a high reputation among musicians everywhere. Some of the most important developments in pianoforte construction have first been introduced in the Chickering piano.

Chick'weed (*Alsino media*), an annual plant abounding throughout the world in ill cultivated or neglected places. It is botanically related to the corn-cockle or Agrostemma, belonging, like it, to the natural order of the *Caryophyllaceæ.* It grows in waste places throughout North America, and may be used when young as a substitute for spinach and other greens.

Chiclana, chē-klä'nä, Spain, a town in Andalusia, 12 miles southeast of Cadiz. It stands in a plain on both sides of the Lirio, and about a mile northeast of Barrosa, famous for the defeat of the French, under Marshal Victor, by the British under Gen. Graham, in 1811. It consists of well built houses of hewn stone, white as snow, and generally enclosed by gardens. The principal buildings are a magnificent hospital, two parish churches, and a large and well-decorated theatre. The manufactures consist of linen, starch, earthenware, and other articles, and there is a considerable trade in corn, wine, and fruit. The baths of Chiclana, which have a temperature of 60°, and are said to be very efficacious in cutaneous affections, are much frequented. Pop. 12,348.

Chiclayo, chē-klä'yō, Peru, a city in the northwest on the coast, is near a valuable sugar district, and the shipping of the sugar is its chief occupation. Pop. 14,000.

Chicle-gum, chēkl- or chē'klą-, an elastic gum produced by the bully-tree, naseberry, or sapodilla (*Achras sapota*), a native of South America. It is largely imported into the United States for the purpose of being manufactured into chewing-gum.

Chico (chē'kō) **Series,** the Upper Cretaceous rocks that originally extended in a broad belt from Lower California northward beyond the Queen Charlotte Islands, and covered the region of the Coast and Cascade ranges. The lower portion of the Chico beds comprises sandstones and conglomerates chiefly, and is from 900 to 1,400 feet thick. The upper portion is mostly shale with some sandstone. The greatest thickness of the whole series in Tehama county, Cal., is nearly 4,000 feet. On Vancouver Island the Nanaimo beds of Chico age contain valuable seams of coal. The fossils show a fauna related to that of southern Asia rather than to the interior American continent. See CRETACEOUS SYSTEM.

Chic'opee, Mass., city in Hampden County, on the Connecticut River, at the mouth of the Chicopee, four miles north of Springfield, and on the Boston & Albany, and Boston & Maine R.R.'s. It is connected with Holyoke and Springfield by electric street railway lines. The former villages of Chicopee Falls, Willamamsett, and Fairview are now included in Chicopee city, which has manufactures of cotton, artillery, bronze, bicycles, rifles, swords, paper, etc. Manufacturing power is furnished by the Chicopee River. It contains numerous churches, public and parish schools, national and savings banks. Pop. (1900) 19,167.

Chicopee River, rises in Worcester County, Mass., flows south southwest into Connecticut River. It has an abundance of water power which is utilized for manufacturing by the numerous towns on its banks.

Chic'ory, or **Succory,** a perennial herb (*Cichorium intybus*) of the natural order *Compositæ.* It is a native of Europe which has become naturalized in many parts of the world, having escaped from gardens in which it is often grown as a pot-herb and salad, or for its roots, which, while young, are used like carrots. In many places it has become troublesome as a weed. The plant may be cultivated like other root crops upon rich, deep, well-drained soil. It resembles dandelion in its leaves, but the perennial roots send up a branched flower-stem which bears leaves of various shapes and flowers of various colors, blue predominating, but pink and white not being uncommon. Besides the use of the root leaves in a green state for salads and as a boiled vegetable, the roots are made to produce two important salads,

witloof and *barbe de capucin.* For these they are dug late in autumn and trimmed of their leaves and superfluous branching roots, and buried in sand or soil in a dark cellar. For witloof, or white leaf, they are stood in a vertical position and covered with several inches of fresh manure or tanbark packed hard; for *barbe de capucin,* they are laid horizontally in pyramidal heaps, a layer of soil and one of roots alternating. In both cases the soil is moistened and the temperature kept uniform. In two or three weeks small heads form in the first case, and long white leaves in the second. Chicory is much more widely grown for its roots, which are used as a substitute for and an adulterant of coffee. The roots are dug, washed, sliced, dried in kilns, roasted in coffee-roasters, ground, and marketed in bulk, in packages, and in sticks. Among the foreign-born population chicory is largely used as a beverage, and since American fields do not supply the demand it is imported from Europe, where the use originated during Napoleon's time. As an adulterant chicory is far less used than is popularly supposed. Its presence may be easily detected by placing a little of the suspected article in a glass of water. Chicory will soon sink and stain the water brown; coffee will float for a long time and then scarcely discolor the water.

Chicoutime, shē-koo-te-mē, Dominion of Canada, county of the Quebec province, formed from Saguenay in 1853. Several smaller sheets of water are scattered over its surface, and the Saguenay intersects it, receiving in its course several small tributaries. The surface is rocky, rough, and broken, but near the streams are fertile and cultivated strips. A great deal of lumber is cut and sawed on the small streams emptying into the Saguenay. The Hudson Bay company have several stations in the county. Capital, Chicoutimi. Pop. 23,760.

Chief Justice, the title of the presiding justice of the supreme court of the United States, and of the presiding justice of the several State supreme courts. Various other courts in the United States are also presided over by a chief justice. The following is a list of the persons appointed as chief justice of the supreme court of the United States from its establishment, some of whom, however, being rejected by the Senate, or, declining the position, never served:

John Jay, of New York, appointed by Washington 26 Sept. 1789; resigned 1791.

John Rutledge, of South Carolina, appointed by Washington 1 July 1795; rejected by the Senate 15 Dec. 1795.

William Cushing, of Massachusetts, appointed by Washington 26 Jan. 1796; declined promotion from his associate justiceship.

Oliver Ellsworth, of Connecticut, appointed by Washington 4 March 1796; resigned 1800.

John Jay, of New York, appointed by John Adams 19 Dec. 1800; declined.

John Marshall, of Virginia, appointed by John Adams 31 Jan. 1801; died 6 July 1835.

Roger Brooke Taney, of Maryland, appointed by Jackson 15 March 1836; died 12 Oct. 1864.

Salmon Portland Chase, of Ohio, appointed by Lincoln 6 Dec. 1864; died 7 May 1873.

George H. Williams, of Oregon, appointed by Grant 1873; rejected.

Caleb Cushing, of Massachusetts, appointed by Grant 1873; rejected.

Morrison R. Waite, of Ohio, appointed by Grant 21 Jan. 1874; died 23 March 1888.

Melville W. Fuller, of Illinois, appointed by Cleveland 20 July 1888.

Chief Justice, or **Lord Chief Justice,** in England; the presiding judge in the king's or queen's bench division of the high court of justice, and, in the absence of the lord-chancellor, president of the high court, and also, *ex officio,* one of the judges of the court of appeal. The chief justice of the court of common pleas, previous to 1881, was the presiding judge in the common pleas division of the high court of justice, but the office is now merged in that of the chief justice of England. The title chief justice is also generally given in the various British colonies to the heads of the different judicial establishments, as in Canada, Australia, etc. In Canada there is not only a chief justice at the head of the supreme court of the Dominion, but also chief justices in the separate provinces.

Chief of Staff. See GENERAL STAFF OF THE UNITED STATES ARMY.

Chiemsee, hēm'zā, the largest lake in Bavaria, circle Isar, district Trostberg, 48 miles southeast of Munich; greatest length, 10 miles; greatest breadth, 9 miles; area, 74 square miles; depth, about 480 feet. It is of an irregular shape, very much indented, and contains three pretty islands — Krautinsel, Herrenwörth, and Frauenwörth.

Chieri, kē-ā'rē, Italy, in the province of Turin, eight miles east-southeast of the town of Turin. It is walled and well built, contains the largest Gothic church in Piedmont, with a very ancient baptistery, and at a very early period became celebrated for its manufactures of fustian, which are still flourishing. Pop. 10,000.

Chieti, kē-ā'tē, Italy, capital of province of same name, on a hill near the right bank of the Pescara. It was anciently one of the largest and most important towns in this part of Italy, and was for some centuries in possession of the Greeks, from whom it passed successively to the Romans, Lombards, Franks, and Normans. In 1802 it was taken by the French troops. The modern town, which is well built and adorned with several handsome edifices, is the see of an archbishop and the seat of a superior civil and criminal court, and has manufactures of woolens, and a trade in silk, wine, wheat, and oil. Pop. 12,273.

Chiff-chaff, a small European bird (*Sylvia hippolais* or *Phylloscopus collybita*), of the warbler family (*Sylviidæ*), so named from its cry. Its head, back, and upper wings are ashy brown, and its under parts are brownish green dashed with yellow. In length it is between four and five inches, and it frequents woods, hedges, and thickets. Its food consists of the larvæ of various insects and some of the smaller moths.

Chigi, kē'jē, a noble Italian family, founded by AGOSTINO CHIGI (d. 1512) of Siena. He became a patron of the fine arts and banker for the Pope. (See Cugnino's 'Agostino Chigi il Magnifico.') FLAVIO CHIGI (b. 1810) was one

of the papal guard until 1848, when he was made Bishop of Mira *in partibus*, nuncio at Munich, but was sent to Paris (1873) and later made cardinal, d. 15 Feb. 1885. The head of the family is Prince of Campagnano and Duke of Ariccia. He is also hereditary marshal of the conclave.

Chignecto (shĭg-nĕk'tō) **Bay**, an inlet at the head of the Bay of Fundy, in the Dominion of Canada. It separates Nova Scotia from New Brunswick, is 30 miles long and 8 broad, and has an isthmus of only 14 miles in width between it and Northumberland Strait, in the Gulf of St. Lawrence.

In October 1888 work was begun on the construction of a ship railway across the neck of land connecting Nova Scotia with the main land of Canada, under the encouragement of an annual subsidy from the Canadian government. The promoters had spent nearly $4,000,000 on the work, when in 1890 a financial depression in London prevented them from obtaining further capital. As the subsidy from the Canadian government was to be payable on the completion of the work in a given time, the contractors were unable to secure any aid from that source. In March 1901 the undertaking was revived. The railway was projected to be 18 miles long, and by uniting the Gulf of St. Lawrence with the Bay of Fundy and the waters of the Atlantic Ocean, a run of several hundred miles around the province would be saved.

Chignon, shēn-yôṅ, a peculiar arrangement of the hair, worn by women, a knot or mass, natural or artificial, arranged low on the back of the head, at the nape of the neck. It comes from a French word meaning link or chain. This style of hair-dressing was common in the 18th century, but fell into disuse, was revived in the last half of the 19th century, not now in vogue.

Chigoe, chē'gō. See JIGGER; SARCOPSYLLA.

Chihuahua, chē-wä'wä, Mexico, a state bounded on the north by the United States, on the east by Coahuila, on the south by Durango, and on the west by Sinaloa and Sonora. It is the largest of the Mexican states, having an area of 227,468 square kilometres, or about three times that of the State of New York. The Sierra Madre range traverses the state, and the Sierra de Tarahumares lifts its peaks (Bufa de Cerro Prieto, Jésus y Maria, Mesa de Tabascotes, etc.) to a considerable height; otherwise the surface is an undulating table-land, the elevation of which varies from 3,500 to 7,000 feet above sea-level. The largest of the elevated plains lying between the mountain ranges are the Chilicote, Gigantes, Bolsón de Mapimi, etc. The Rio Grande forms the northern boundary, separating the state from the United States; but this river, which rises in Colorado and flows through New Mexico, is almost dry by the time it reaches Mexican territory, the greater portion of its waters having been utilized for the irrigation of lands in the country of its origin. The mineral resources of Chihuahua are probably not surpassed by those of any other region in the republic. Gold, silver, copper, and lead are being mined with profit, and it is thought that the deposits of coal will prove to be valuable when transportation facilities are provided. The climate is healthful, though the summers are long. Even during the hottest months the nights are cool, and in winter frost and snow are not unknown. The summer is the rainy season. Cattle, sheep, horses, and mules are bred in great numbers. Haciendas, several hundred square miles in extent, are common, and 30,000 or 40,000 calves are branded yearly on some of the large ranches. The cultivation of cotton is restricted to the lower lands near the rivers; corn, wheat, oats, rye, potatoes, beans, and many fruits and vegetables of the temperate zone, grow readily in the uplands. Forests of oak and pine cover the mountain slopes in some parts of the state. Cedar is found in the Sierra Madre. There are nine colonies of Mormons, all successful in agriculture. Cattle, sheep, and hogs are exported to the United States. (For manufactures, see CHIHUAHUA [City].) The main line of the Mexican Central Railway runs through the state for a distance of 850 kilometres; a branch of that road crosses the mining district of Parral; the Mexican Northern Railway runs from Escalon to Sierra Mojada, state of Coahuila, connecting a region of low-grade lead ores with the Mexican Central system; and, finally, the capital of the state is to be united with mining and agricultural sections by the Rio Grande, Sierra Madre and Pacific Railway, and the Chihuahua and Pacific Railway, neither of which is yet completed. Wagon-roads are numerous and good. The state is divided into 10 districts, the names, population, and principal towns of which are as follows: Andres del Rio, population 14,450, principal town Batopilas; Arteaga, 8,075, principal town Chinipas; Bravos, 25,122, principal town Juarez (4,500); Camargo, 27,126, principal town Santa Rosalia; Guerrero 22,252, principal town Ciudad Guerrero (4,250); Hidalgo, 36,997, principal town Hidalgo del Parral (7,000); Iturbide, 72,869, principal town Chihuahua, capital of the state; Jimenez, 23,377, principal town Jimenez de los Santos; Mina, 16,978, principal town Guadalupe y Calvo; and Rayon 15,521, principal town Ocampo. Statistics of 1897 show 127 public and 45 private schools; total attendance 4,775 boys and 2,164 girls. The state has (statistics of 1902) a population of 262,271 persons, of whom 8,000 are Indians belonging principally to the Tarahumara race. Number of inhabitants to the square kilometre, 1.15.

Chihuahua, Mexico, the capital city of the state of the same name (q.v.). It is the metropolis of the entire northwestern section of the republic; supplies outfits for a majority of the mining camps and prospecting expeditions of the state; and has manufacturing establishments, banks, and commercial houses engaged in various branches of business. One of the largest iron foundries and machine factories in Mexico has its works here. Cassimeres, blankets, carpets, cotton goods, beer, etc., are other products of the place, which is conspicuous among towns of its size and country for activity and enterprise.

In the Mexican war, Chihuahua was to have been occupied by Gen. John E. Wool; but the latter marched to Taylor's assistance, and enabled him to win the battle of Buena Vista. Col. Alexander W. Doniphan, however, sent by Gen. S. W. Kearney to reinforce Wool at Chihuahua, occupied the city

without opposition, and finding that he was not needed and Wool was not coming, soon abandoned it. Pop (1902) 25,000.

Chilán Balám, chē-län' bä-läm', **Books of,** a series of Maya writings which have been preserved, supposed to have been written by a Maya priest by the name of Chilán Balám. They concern the life of the people before the arrival of the Spaniards; and it is said that the author prophesied the coming of a strange people.

Chi'law, Ceylon, a town on the west coast, near the mouth of the Dederoo-oya, 45 miles north by west from Colombo. Its proximity to the pearl-fisheries gave it an interest which it did not otherwise possess, and made it repeatedly the object of a keen contest. The Tamils wrested it from the Singhalese in the 14th century, and it afterward passed successively to the Moors, the Portuguese, and the Dutch. From the last it was taken by the British in 1796. In the forest to the east of Chilaw, within a radius of 20 or 30 miles, are contained the ruins of a number of ancient cities. The road leading from Chilaw southward to Negombo passes through almost continuous cocoanut plantations. Pop. 5,000.

Chilblain, or **Frostbite,** a mild or severe inflammatory reaction from the effects of severe cold on the toes, fingers, nose, chin, ears, etc. In mild cases there is swelling only, with an inflammation of the skin. This disappears and the part is apt to be tender. In severe frostbite there is ulceration and sloughing of the part. The treatment of mild chilblain is by slow raising of the temperature of the chilled part to that of the body. Too rapid heating results disastrously. Special clothing may be necessary for the tenderness, particularly of the feet.

Child, Francis James, American scholar and educator: b. Boston, Mass., 1 Feb. 1825; d. Cambridge 11 Sept. 1896. He was professor of rhetoric and oratory at Harvard from 1851 till 1876, when he exchanged for the chair of English literature. His principal work, 'English and Scottish Ballads,' a subject on which he was the highest authority in this country, he improved and enlarged for publication in 1886. Among his other works are 'Four Old Plays' (1848); a collection of 'Poems of Sorrow, Comfort, Counsel, and Aspiration' (edited 1865); and 'War Songs for Freemen' (edited 1862).

Child, Frank Samuel, American Congregational clergyman: b. 20 March 1854. He was educated at Hamilton College, N. Y., and after graduating from Union Theological Seminary in 1878 was ordained to the ministry. Since 1888 he has been pastor of the First Church of Fairfield, Conn. He has published 'An Old New England Town' (1895); 'The Colonial Parson of New England' (1896); 'A Colonial Witch' (1897); 'A Puritan Wooing' (1897); 'The House with 60 Closets' (1899); 'An Unknown Patriot' (1899); 'The Little Dreamer's Adventure' (1900); 'Friend or Foe' (1900).

Child, Sir **Josiah,** English merchant: b. London 1630; d. there 1699. The work by which he is known is entitled 'Brief Observations Concerning Trade and the Interest of Money, by J. C.' (London 1668). An enlarged edition was published in 1690, under the name of 'A New Discourse on Trade.' The work has been several times reprinted. It was written in defense of the reduction, by legal enactment, of the rate of interest on money from 8 to 6 per cent, and recommends a further diminution to 4 per cent. He was for some time chairman of the East India Company, and wrote several papers, without signature, in defense of the traffic with the East, arguing, in opposition to those who complained of the drain of coin, that the India trade percolated through other countries with which Britain traded, and thus returned indirectly a surplus in cash. In his essay on trade he advocated the compulsory emigration of paupers to the colonies, and suggested the appointment of corporate officers called «fathers of the poor» to superintend those who were left. He became very wealthy, and his children, by three marriages, allied themselves with the highest nobility. Charles II. made him a baronet. His son became Earl Tylney, but the title is now extinct.

Child, Lydia Maria Francis, American prose writer: b. Medford, Mass., 11 Feb. 1802; d. Wayland, Mass., 20 Oct. 1880. She was married to David Child, a Boston lawyer, in 1828. Her first novel, 'Hobomok,' was written and published in 1821. She was an ardent abolitionist, and published one of the first anti-slavery books, entitled 'Appeal for that Class of Americans Called African,' one immediate result of which was the loss of her former literary popularity in the southern States. From 1841 to 1844 she and her husband edited the 'National Anti-Slavery Standard.' Among her numerous works are 'The First Settlers of New England' (1829); 'Philothea, a romance of Greece in the days of Pericles' (1835); 'Fact and Fiction' (1846); 'Isaac T. Hopper: A True Life' (1853); 'Progress of Religious Ideas' (1855); 'Looking Toward Sunset' (1864); 'Miria: A Romance of the Republic' (1867); and 'Aspirations of the World' (1878). A collection of her letters, with an introduction by John G. Whittier, and an appendix by Wendell Phillips, was published in 1882.

Child-labor. The growth of child-labor is coincident with the introduction of machinery and the development of the factory system. Arkwright obtained his first patent for a machine for spinning cotton yarn in 1769, which immediately resulted in taking the manufactures out of the English cottages and farmhouses. Compton's spinning mule followed in 1775, Cartwright's power loom in 1787, and Eli Whitney's famous cotton-gin in 1793. The sudden displacement of home labor, the rapid development of manufacturing, and the substitution of mere mechanism for the skill of the individual operative, resulted in a demand for cheap child-workers. The employment of children soon became general, and large numbers were crowded together in factories, before the change had attracted much attention. It began with the apprentice system, the children being procured from the poorhouses of London, Birmingham, and southern England.

«Agreements of the most revolting character were often made between the manufacturers and the different parish workhouses for bands of children for a number of years, in which the condition of the children was totally disre-

garded. Such, for example, were those provisions whereby it was agreed that with every 20 sound children one idiot should be taken." (William F. Willoughby, American Economic Association, March 1890.) In 1784 the magistrates of Lancashire passed a resolution that apprentices should no longer "work in the night or more than 10 hours in the day." No protection was provided for children who were not parish apprentices, and no inspection was established, so that the resolution had no force, and remained a dead letter. In 1802 Sir Robert Peel, Sr., secured the passage of a bill abolishing the apprentice system, so far as the cotton factories were concerned. This mild measure met with bitter opposition from the manufacturers, and was of very little immediate benefit, but it was valuable as the first definite step to awaken public sentiment to the evil. According to Walker (Political Economy): "The beginning of the present (the 19th) century, found children of five and even three years of age in England working in factories and brick-yards; women working underground in mines, harnessed with mules to carts, drawing heavy loads; found the hours of labor whatever the avarice of individual mill-owners might exact."

In 1815 a parliamentary committee was appointed to "inquire into the expediency of extending the Apprenticeship Act to children of every description." During the next three years reports were presented which showed that the children employed were worked to the point of exhaustion, and that their condition was worse than slavery. In 1819 an act was passed forbidding the employment of children under 9, and the hours of labor for those between 9 and 16 were limited to 12 hours a day. In 1833 Lord Ashley, afterward Earl of Shaftsbury, introduced a bill which extended the provisions of former acts, and stipulated that inspectors should be appointed to enforce the law. During the following years until 1878 various progressive steps were taken, under the able championship of such men as Lord Shaftsbury and Robert Owen. The act of 1878 was the culmination, and is still regarded as an admirable code for factory legislation. It prohibits the employment of children under 10, and those under 14 may only be employed half time. Night work is forbidden, and children under 16 must furnish medical certificates of fitness for employment. Weekly certificates must be obtained, showing the required amount of school attendance.

During the first half of the 19th century, every political economist opposed factory legislation, and the employers were practically unanimous in their opposition to any abridgement of their right to employ children. The motives of the early reformers were exclusively humanitarian, and they advocated the necessity of protecting women and children because they are not "free agents." It is, however, generally conceded now that the real grounds of state interference with, and regulation of industry are considerations of the safety and well-being of the community. In accordance with this principle, acts were passed in 1891, 1895, 1898 to regulate home work, to prohibit the employment of women for one month after the birth of a child, to prevent and define overcrowding in future, and to minimize the evils of dangerous trades and occupations. A whole code of special rules for each dangerous trade has been formed by the home secretary, to enforce precautions for the protection of the workers, and an arbitration court is provided for the adjustment of protests. According to Thomas Oliver, "Experience shows that there is scarcely a dangerous trade from which, with extreme care and attention to regulations, the dangerous influences cannot be largely removed."

Perhaps the most marked difference between the development of child-labor legislation in Great Britain and in the United States, is this — that in Great Britain, a knowledge of the conditions has always preceded legislation, whereas in many of the American States legislation has been hasty and ill considered, and frequently in advance of public information and public sentiment.

Social legislation which affects industrial interests must be supported by an intelligent public opinion, which has been educated to believe that a state of evil exists, and that the remedies proposed are really necessary. The mere passage of a law may have a certain educational value, but it cannot be enforced without a public conviction of its value. In 1889 Mrs. John Armstrong Chanler offered a prize, through the American Economic Association, for the best essay on child-labor. The prize was divided equally between William F. Willoughby and Miss Clare De Graffenried, both of whom were connected with the Federal Department of Labor, and their essays are still the best general source of information as to the conditions in the United States. Mr. Willoughby says that in England "the regulation of factories and labor is the single duty of the central government, while here it falls to the different State legislatures. As a consequence, while throughout England the laws are uniform, and but one set of statutes and reports, those of Parliament, which are easily accessible, have to be studied; here no two States have the same laws; only a comparatively few have any at all; and information must be obtained through the various bureaus of labor or the reports of the inspectors of factories and workshops. . . . These reports are often unsatisfactory, and are confessedly unreliable. Each department is conducted in its own way. Some, with adequate means, are well organized, and their reports are of the greatest possible value, while others, with very limited resources, can do but feeble work. The law creating them has, in most cases, been inadequate and too timid." He adds that in no case can the statistics of one State be compared with those of another, and that the reports of the State bureaus are in most cases incomplete, "owing to the refusal of the factory owners to make returns or the gross falseness of many of those which were made." At the time Mr. Willoughby wrote (1889), the following States had organized labor bureaus: Massachusetts, 1869; Pennsylvania, 1872; Ohio, 1877; New Jersey, 1878; Illinois and Indiana, 1879; New York, Michigan, Wisconsin, Missouri, and California, 1883; Iowa and Maryland, 1884; Connecticut and Kansas, 1885; Rhode Island, Maine, Colorado, Minnesota, North Carolina, and Nebraska, 1887. In the 14 years which have intervened since Mr. Willoughby wrote, the following States have established bureaus of labor statis-

tics, or have provided for factory inspection, or have legislated in some way for the regulation of child-labor, namely, Alabama, Arkansas, Kentucky, Louisiana, Montana, North Dakota, Oregon, South Carolina, South Dakota, Tennessee, Texas, Virginia, Washington, and West Virginia; and legislation is now pending in the State of Georgia. There has been a great awakening of public sentiment on the subject of child-labor during the last few years and at the present time the general interest is intense. The governors of seven different States have referred to it during the past year in their annual messages, and in one form or another bills to regulate child-labor or amend former laws have been introduced recently in most of the manufacturing States. Much of this legislation is for the purpose of improving the administration of the departments of inspection, which is almost as lax as it was 14 years ago. Very little progress has been made in the compilation of data on child-labor. The writer has recently examined the reports for 1901 and 1902 of the various State bureaus of labor statistics and factory inspection, and can confirm literally to-day Mr. Willoughby's findings of 14 years ago!

In a number of the manufacturing States child-labor laws were first passed at the instance of the labor organizations, and for the purpose of placating the "labor vote." Many of the States have failed to make adequate provision for the cost of inspection, and only a few of the inspectors have been men of trained observation, or men whose previous experience has been such as to fit them in any way for the exacting duties of their office. In some States the department of factory inspection has simply been the football of politics, and the inspectors have been changed with each administration; while in others, the "spoils" have fallen to local labor leaders, who have been placed in positions of great responsibility, overloaded with diverse duties, and allowed a free hand without any supervision. For some reason or other, the laws for the regulation of child-labor have been fully enforced in a few of the States only, and much of the available data as to the number and ages of the children employed, is still very unreliable. The figures of the 12th census (1900) quoted below, may be taken as a minimum estimate only, since they are based on schedules filled out by the manufacturers themselves, at their own discretion, without any verification of the census taken. In fact, the director of the census says himself:

"The limitations connected with the taking of a great national census preclude proper care upon the question of child employment. There is a great uncertainty as to the accuracy of a mass of information of this character taken by enumerators and special agents, who either do not appreciate the importance of the investigation, or find it impracticable to devote the time to the inquiry necessary to secure good results. Again, the answer to the question, 'average number of children under 16 years of age,' may have been inconsiderately given, or, if considered, answered more as the word 'children' was construed by the individual than according to the interpretation intended by the schedule to be placed upon it. The word 'children' to manufacturers has many meanings, in accordance with the geographical location of their plants, or the character of the work performed."

According to the census, the average number of children under 16 years of age (evidently including only those in factories) earning wages in 1900 was as follows:

States	No. children	States	No. children
Alabama	3,474	Missouri	4,510
Arizona	38	Montana	112
Arkansas	643	Nebraska	776
California	2,114	Nevada	20
Colorado	243	New Hampshire	1,651
Connecticut	3,479	New Jersey	8,042
Dakota	6	New Mexico	29
Delaware	859	New York	13,189
District of Columbia	116	North Carolina	10,377
Florida	374	Ohio	4,369
Georgia	6,373	North Dakota	37
Hawaii	40	Oregon	38
Idaho	23	Pennsylvania	33,135
Illinois	10,419	Rhode Island	5,036
Indiana	3,618	South Carolina	8,560
Indian Territory	16	South Dakota	114
Iowa	1,888	Tennessee	2,171
Kansas	860	Texas	1,041
Kentucky	2,687	Utah	218
Louisiana	1,321	Vermont	263
Maine	2,202	Virginia	4,164
Maryland	5,884	Washington	265
Massachusetts	12,556	West Virginia	840
Michigan	2,636	Wisconsin	5,679
Minnesota	792	Wyoming	15
Mississippi	1,049	United States	168,623

According to the United States agent of the Department of Labor, Mr. Wm. Waudby, there were approximately 860,700 children between the ages of 10 and 15 years employed in various "gainful occupations" in 1880 in the United States; in 1890 that number had grown to 1,750,000!

Miss De Graffenried's essay, referred to above, is still the best available statement of conditions of child-labor in many manufacturing industries, notably corset factories, box factories, packing houses, and tobacco and woolen manufacture. In 1891 she wrote an article (based on personal investigation) dealing with the deplorable conditions of child-labor in the southern cotton mills, which excited violent controversy in the South (Century Magazine, February 1891), but her assertions have been fully confirmed during the past two years by the child-labor committees of Alabama and Georgia. In the same way the statements made by Miss De Graffenried in her prize essay as to the evils of child-labor in the sweat-shops, and in the large department stores and mercantile establishments, have been completely verified by the subsequent investigations of the New York Tenement House Commission and the National Consumers' League. The determined and successful fight waged by the Alabama Child-Labor Committee, under the direction of Mr. Edgar Gardner Murphy of Montgomery, Alabama, for the passage of a law to forbid the employment of very young children, deserves special mention. His printed arguments are a part of the permanent literature of child-labor, and created such a wave of public sentiment, that the organized and powerful opposition of the cotton mill owners was finally overcome and the legislature forced to yield to the popular pressure. The owners of the cotton mills in Georgia put forward the plausible plea that compulsory education laws should precede legislation to prevent employment of children under 12. The effect of this would simply be to postpone action for another generation, since the State cannot afford to provide sufficient schooling

facilities until its resources increase in value, or its pensioners die off. At present Georgia is burdened with an annual pension tax of nearly $1,000,000, and the misfortunes of the parents are reflected in the ignorance of their children. In this connection the following deductions from the census of 1900 are interesting:

	White Children of School Age 5 to 20.	White Illiterates of 10 years and over.
Alabama	394,152	104,883
Georgia	457,958	101,264
North Carolina	490,782	175,917
South Carolina	218,323	54,719
Virginia	435,612	98,160

One main cause of the extent of child-labor abuses in the southern cotton mill States is the general lack of vagrancy laws. The "poor white" is shiftless and lazy, and will not work indoors, and in the general exodus of his family to the factory towns, he has been left out of the calculation. His wife and children find their way into the factories, while he exists on the proceeds of their labor. An action for non-support is almost unknown, and not only is there no apparent remedy for the evil, but the State by its failure to prevent the slavery of his children, puts a premium upon the idleness of the parent! Of course the enforcement of compulsory education laws, in conjunction with a simple educational test for children of school age who seek employment, is a powerful aid to the factory inspector. Indeed the State of New Hampshire controls the whole matter by giving its truant officers the right to enter all mechanical, mercantile, and manufacturing establishments, and make a rigid examination; and so far has not found it necessary to employ a factory inspector. But it is reasoned that if, in a community where free schooling is lacking, the factory owners were forbidden to employ children who cannot read and write, the practical result would be to induce the parent to provide for his children's education, in order that they might the sooner qualify as wage-earners.

The child-labor committee of New York has just won a similar victory in securing the passage of laws to license newsboys, and to protect telegraph, messenger, and delivery boys. This movement originated with the social settlement workers, whose daily life brought them into contact with the actual conditions of the "street boy." The report of this committee also is very valuable.

During the past winter the Anthracite Coal Strike Commission developed the fact that large numbers of children under the statutory age were employed in the coal mines and silk and knitting mills of Pennsylvania, under most distressing conditions. As the result of the commission's investigation, bills were introduced to raise the age limit of breaker-boys to 14, and of mine employees to 16, and to abolish the night work of little girls in mills and factories. The first two measures were supported jointly by the coal operators and their employees, and were passed. The other measure failed, but the various women's organizations of Pennsylvania have taken the matter up, and have organized a committee of citizens to fight for legislation and to see that existing laws are rigidly enforced.

The problems of child-labor are now engrossing the attention, not only of the economists, but of those who are engaged in studying the causes of social disorder, and seeking to prevent pauperism and disease. Charity workers have found that child-labor is wrapped up and interwoven with many of the problems of disease, of crime, and of dependence, and the Thirtieth National Conference of Charities and Correction, which met in Atlanta, Ga., May 1903, devoted two notable sessions to the discussion of 'Child-Labor as a National Problem.' The addresses and discussions will be published in the proceedings of the conference. The sixth annual meeting of the American Academy of Political and Social Science was also largely devoted to the subject, and the annals of the academy for July 1902 contain the papers which were read. The women's clubs are also agitating the subject continually, and the labor men no longer have to fight alone for the passage and enforcement of child-labor laws. In almost every State a strong body of public sentiment is being brought to bear upon the subject, and there is general demand for a thoroughly scientific investigation of existing conditions, and better facilities for regulating the employment of children.

The State of Massachusetts has hitherto supplied the standard of statutory law and administration in this department, but Mrs. Florence Kelley is now heading the forward movement for better methods, and her article in the Annals of May 1903 on 'An Effective Child-Labor Law' may be taken literally, as she suggests, as 'A Problem for the Current Decade.'

A careful study of the status of child-labor in Europe, as made by Miss Edith J. Rich, reveals the fact that "no state is without some protection against this evil, and no state affords a protection even approximately adequate. For a century and a half the separate countries slowly developed a public sentiment against child-labor and formulated laws upon the subject, but harmony of action was not attempted until 1890, when an International Labor Conference was held in Berlin. At this conference it was decided to recommend to every state in Europe the passage of the following law, as a safeguard against industrial decay: That children of either sex not having reached a certain age must be excluded from factories, the age limit to be fixed at 12 years, except for southern countries, where it be fixed at 10. Bald statistics show the following as the present conditions: In Switzerland the age limit is 14; France and Germany, 13; Hungary, Portugal, Holland, Sweden, Russia, Austria, and Belgium, 12; England, 11; Denmark and Spain, 10; Italy, 9.

But these statistics, unqualified, give no conception of the true state of affairs. England is, in reality, far from the bottom of the list in matter of protection, and Switzerland's position at the head would not pass unchallenged. And this for many reasons. In the first place, the age limit itself is invariable in few cases. In Hungary and Portugal, for example, the limit is fixed at 12, but may be reduced to 10 if the applicant has a medical and educational certificate of fitness, which is not at all hard to obtain. In England, on the other hand, the exception has the contrary effect. The limit is fixed at 11, but this is raised to 13 unless a child can show a proper certificate of education. In Ger-

many, Denmark, Austria, Norway, Sweden, and Russia, the tendency is also upward rather than downward from a given standard.

The next difficulty in the way of estimating European conditions from statistics, lies in the lack of harmony between child-labor laws and those cognate laws without which the former are ineffective. In Germany, for instance, child-labor is prohibited under the age of 13, and even then, unless the primary education is complete; the system of compulsory education is good; the employer is made liable for all risks, and there are special regulations for the dangerous trades; but the definition of a factory is so indefinite that many important industries escape factory jurisdiction entirely; the system of inspection is so incomplete and the penalties for violation so slight and so seldom enforced that a large and growing number of children are employed. It is said that the Saxon mines are full of children, and that in this same province children five and six years old are employed in the "flat-stitch" trade, earning two and one fourth cents an hour, and working from 10 to 12 hours a day.

Belgium shows much the same result from another cause. The laws are good and the system of inspection is almost unequaled, but compulsory education is unpopular there, and, as is always the case when educational laws do not supplement those prohibiting child labor by offering a substitute employment for the child, the effect of legislation is negatived. There both the parent and employer are made liable for a violation of the law, and 45 trades are absolutely forbidden; but it is the custom to grant exemptions, and the census of 1896 showed that out of 671,596 laborers 76,147 were under 16 years of age. And even these startling figures do not include the workers in the domestic workshops, which are the *bête noire* of child-labor reformers.

These domestic workshops are a relic of a dead system in vogue before the rise of factories where labor is concentrated. They remain to-day in almost every country of Europe practically excluded from factory legislation. The line that divides factories from domestic workshops differs in all cases and is usually so drawn as to exclude from factory jurisdiction large and important industries, whose representatives have power enough to influence legislation. This is especially true in Russia, and is also notable in Belgium, where the entire clothing industry is beyond reach of the child-labor laws. In Austria it takes 20 persons to make a factory; in Italy 10 persons or the use of mechanical motors; in Germany the inspector is free to define an industry as it suits his purpose; in Switzerland the definition is as follows:

1. All industrial establishments where more than five persons are employed and use is made of mechanical motors or where persons under 18 are employed or which present unusual danger to the health or lives of employees.

2. All industrial establishments employing more than 10 persons, whether they present foregoing conditions or not.

3. All industrial establishments employing less than six persons and presenting unusual danger to health or lives of employees or those employing less than 11, but presenting plainly the type of factories.

And yet in spite of this inclusive definition the domestic workshops of Switzerland, which form a large part of Swiss industrial establishments, continue to employ children unmolested. The reason is not far to seek.

Among the leading Swiss industries are watch- and clock-making, the making of paper boxes, embroidery, wood-carving, silk- and cotton-weaving. For centuries these industries have been carried on in the provinces in small establishments, seldom employing more than 10 or 12 persons. In many cases the parent is the employer, and the children the only employees; in others apprenticeship is still in vogue, although that system practically died with the death of the trade guilds. The Swiss federal laws are limited to factories and dangerous trades, the cantons reserving to themselves the right of apprenticeship legislation. In the special Swiss industries, a certain deftness, flexibility and agility are required which can, with difficulty, be acquired by a person who has not begun the work in the early years before the joints and the fingers are stiff and the power to learn mechanically is lost. The conditions necessary to progress in these industries have therefore been an effective barrier to the enforcement of the laws militating against child-labor.

These laws, nevertheless, have by no means been void of good. Their presence on the Federal statute books has caused deep study of the methods by which they might be obeyed without injuring the industries of the country. The result has been the establishment of great trade training schools, still in their incipiency, but offering to the student the largest hope for the future. In Berne, schools are already in active and highly successful operation, where a child may learn a given trade while he is receiving his general education. The system employed in these manual training schools must never be confused with the fundamentally opposite system of half-time employment which has proven distinctly unsuccessful in several countries, notably in England. Until such schools are established, however, or until some substitute for them is found, which shall at the same time displace the domestic workshops, there should be, in every country attempting to protect its children, inhibitory laws which shall make the employer responsible, according to the laws provided for factories, for all work from which he receives the profit, whether such work be done with or without pay (to include apprentices) and whether it be done on factory premises or at home; and, further, making the word "factory," as far as child-labor is concerned, cover every possible industry in which a child may engage.

In this connection it is interesting to note a French law, also recently adopted in Belgium, which forbids the employment of children under the age of 13 as actors or at public exhibitions of any kind, and further prohibits those under 16 from becoming acrobats or professional beggars. The Belgian law differs from the French in age restriction. In the former country the prohibition extends to all under 18, unless a parent is the employer, when the age limit is 14.

In the matter of night work and in special regulations against the employment of children in dangerous trades, the outlook is more generally hopeful, both in the matter of statutes

and of their enforcement. Even in Italy 21 trades are absolutely forbidden to children, in Russia 26, and in Belgium 45. Dangerous trades are of two general kinds — those in which the employment of children implies danger to the community, to risk of fire or accident, and those which are dangerous to the worker himself. The latter class is again sub-divided into those in which the danger is inherent or direct, as in the white lead industry, glass-blowing, phosphorus, etc., and those in which the danger is indirect through length of day, employment under ground, and like causes. A notable example of the last class is the mine, child-labor in which is prohibited in almost every country of Europe.

It is almost impossible to make a comparison of the European and American status of child-labor, because neither stands as a unit, being a composite of conditions in various States. The most suitable basis for future reform is harmonious action founded on a study of the universal principles that underlie this great question. What is needed is the universal minimum age limit of 14, which shall remain invariable and impossible of exemption except for unusual cases; a universally accepted definition of factories which shall include every industry in which it is possible for a child to be at work; a universal system of compulsory education to supplement child-labor laws; better factory inspection; stricter enforcement of penalties, and finally, the establishment of great trade schools the world over.»

BIBLIOGRAPHY.— *American.*— Among the various reports and bulletins may be named the following: 'Bulletins of the Department of Labor,' and 'Eighteenth Annual Report of the Department of Labor,' Carroll D. Wright, Commissioner; 'Report of Commissioner of Education,' W. K. Harris (1901); 'Report of Anthracite Coal Strike Commission' (1903); 'Reports of Child-Labor Committee,' New York (1903); 'Report of Child-Labor Committee,' Alabama (1901); 'Reports of Industrial Commission'; 'Reports of the National Consumers' League'; 'Reports of the Industrial Association of Factory Inspectors.' See also 'Reports of Factory Inspectors and Labor Bureaus of the Various States and of the Province of Quebec'; and 'Special Report on the Factory System (Wright) in Tenth Census'; and 'Twelfth Census of the United States' (1902). Authors: Addams, 'Democracy and Social Ethics'; Campbell, 'Prisoners of Poverty'; Ely, 'Social Aspects of Christianity'; Gunton, 'Wealth and Progress'; Riis, 'The Children of the Poor'; Warner, 'American Charities'; Willoughby and De Graffenried, 'Child Labor.'

British.— Booth, 'Life and Labor of the People'; Brooke, 'Tabulation of Factory Laws of European Countries'; Brentano, 'Hours and Wages in Relation to Production'; Cobden, 'The White Slaves'; Eden, 'State of the Poor'; Gibbins, 'English Social Reformers'; B. L. and H. A. Hutchins, 'A History of Factory Legislation'; W. S. Jevons, 'The State in Relation to Labor'; Morant, 'Theory and Practice of Labor Protection'; Oliver, 'Dangerous Trades'; 'Parliamentary Reports'; Pike, 'Life of Lord Shaftsbury'; 'Report of House of Lords' Committee on Sweating System'; Walker, 'Political Economy'; S. and B. Webb, 'Industrial Democracy'; and 'Problems of Modern Industry.'

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Child Psychology. See PSYCHOLOGY.

Childbirth. See OBSTETRICS.

Childe Harold's Pilgrimage, a narrative poem in Spencerian stanza, written by Lord Byron (q.v.). It describes the impressions of a young man traveling in southern Europe, and is marked by a tone of melancholy and dissatisfaction. Many have supposed that Childe Harold represented the poet himself. The poem was published in four cantos, the first two appearing in 1812 and the others in 1816 and 1818.

Childebert, shĕl-dĕ-bār or chĭl'dĕ-bĕrt, three kings of the Merovingian dynasty, France.

1. CHILDEBERT I.: b. about 495 A.D.; d. 558. On his father's death in 511 he succeeded to the kingdom of Paris; his brother, Clodomir, king of Orleans, having been killed in battle, Childebert and his brother, Clotaire, king of Soissons, determined to seize and divide his dominions, and murdered his two eldest sons and their followers. Childebert afterward quarreled with Clotaire and laid waste his territory.

2. CHILDEBERT II.: b. about 570; d. 596. On the death of his father in 575, he was proclaimed king of Austrasia, and subsequently, by the death of his uncle, Gontran, succeeded to the kingdoms of Burgundy, Orleans, and part of that of Paris.

3. CHILDEBERT III., surnamed the Just: b. about 683; d. 711. He was proclaimed king in 695, on the death of his brother, Clovis III. His kingship, however, was merely nominal, the true sovereign being Pepin le Gros or d'Héristal, who, under the title of mayor of the palace, exercised the real authority.

Childermas (chĭl'dĕr-mas) **Day** (Feast of the «Holy Innocents»), a festival celebrated by the Roman Catholic Church, 28 December, in commemoration of the massacre of the male children by Herod.

Children, Societies for the Prevention of Cruelty to, organizations that had their origin in New York, and have since been adopted in most American and many European cities. Experience has proved that defenseless children, even within the range of our boasted civilization, are not infrequently grossly maltreated by parents or other legal protectors, and that therefore special legislation is necessary to secure their proper treatment. To ameliorate the condition of children has, therefore, entered largely into the scope of modern legislation. The operations of the societies show in the strongest light the necessity for their action, though it is but a few years since this special agency was introduced. Under seven a child is supposed to be incapable of committing felony. Between 7 and 14 it is held to be *doli incapax,* that is, incapable of crime, while above 14 it is *doli capax,* that is, capable of crime. If, however, anything atrocious be done with obvious malice by a child, it may be held that *malitia supplet ætatem,* malice supplies (the want of) age. The age at which a child can be sworn as a witness depends on the education it has received and its apparent comprehension of the nature and obligation of an oath.

Children in the Wood, The, or **The Babes in the Wood,** an old English ballad, telling the story of two children whom their uncle wished to murder and who were left to die in the woods, by the man who was ordered to kill them. The authorship is unknown, and the date uncertain; it appears in the 'Stationers' Register' of 1595, and was probably written about that time. An old play, published in 1601, has a similar plot, and the source of the two is supposed by some critics to be the same.

Children of the Abbey, The, a once famous romance, by Regina Maria Roche, published in 1798. The Earl of Dunreath, marrying a second time, is induced by the machinations of his wife to cast aside her stepdaughter, for a luckless marriage. It is with the children of this marriage that the story deals. The motherless Amanda is the heroine; and she encounters all the vicissitudes befitting the heroine of the three-volume novel. These include the necessity of living under an assumed name, of becoming the innocent victim of slander, of losing a will, refusing the hands of dukes and earls, and finally, with her brother, overcoming her enemies, and living happy in the highest society forever after.

Children of the Ghetto, a noted book by I. Zangwill, published in 1892. It is, as the author says, "intended as a study, through typical figures, of a race whose persistence is the most remarkable fact in the history of the world." The book raises problems that it does not solve; but the masterly and sympathetic exposition of the Jewish temperament invites a better comprehension of that wonderful race.

Children of Gibeon, a popular novel by Walter Besant, published in 1886. Like his 'All Sorts and Conditions of Men,' it deals with society in both the West and East Ends of London, and their relations to each other. The plot is so ingeniously managed that it seems entirely plausible; the studies of London wage-earners and London slums are faithful, without being too repulsive; and the tone of the book is cheerful, while many social problems are touched in the course of an entertaining story.

Children of the Soil, a novel of modern Polish life, by Henryk Sienkiewicz, published in 1894. There are interesting side issues to the story, involving questions of property, of the social order, of marriage. The work as a whole, although realistic, is sane in spirit, genial and broad in its conception of life and character.

Children of the World, a romance by Paul Heyse, published in 1873. It obtained immediate popularity, and caused great controversy over the fearless treatment of the theme. The children of the world are represented by a young doctor of philosophy, a strong, well-balanced character; his younger brother, an almost Christlike idealist; and their circle of friends and fellow-students, who, in spite of mistakes and eccentricities, bear the stamp of true nobility of soul.

Children's Crusade, The, a singular movement in 1212, preached in France by Stephen, a peasant boy, and in Germany the same year by Nicholas, also a peasant boy. Some 90,000 children left their mothers and schoolmasters in the spring "to rescue the Holy Land from the infidels," and ships were placed at their disposal. The French contingent embarked at Marseilles in August; part perished the same month by shipwreck on the island of San Pietro, and the rest were sold into slavery to Mohammedans. The German contingent reached Genoa in August, and was utterly dispersed by various disasters before the next spring. See CRUSADES.

Childs, George William, American philanthropist and publisher: b. Baltimore, Md., 22 May 1829; d. Philadelphia 3 Feb. 1894. He published the Philadelphia 'Public Ledger,' 1864–94. He gave a Shakespeare memorial fountain to Stratford-on-Avon, a memorial window in Westminster Abbey to Cowper and Herbert, and assisted in establishing a home for printers at Colorado Springs. He published 'Recollections of Gen. Grant' (1885); and 'Personal Recollections' (1889).

Chile, chĭl'ē, or **Chili,** chĭl'ĭ (the Republic of), situated on the western coast of South America, between the Andes Mountains and the Pacific Ocean, is bounded on the east by Argentina and Bolivia, and on the north by Peru. In length it surpasses even the Argentine Republic, for it extends from lat. 55° 59′ S. to 17° 57′ S., a distance of 2,629 miles, but its average width is only 101 miles. The total area is, therefore, about 265,529 square miles. Besides the Andean range on the east, there is a parallel western coast range, and in the valley between the two ranges, from Santiago, the capital, to the south, are found the best agricultural districts and many of the important towns.

Population.— Compared with the other South American countries, Chile ranks as the seventh in size, the fifth in density of population, and the fourth in the number of its inhabitants. The population of the republic in 1895 was 2,712,145, of which number 1,240,353 resided in cities and towns, and 1,471,792 in the rural districts. There has been a considerable increase during the last few years, and on 1 Jan. 1900, the total population was estimated at 3,110,088. The number of the inhabitants of the principal cities on the date last mentioned was, according to an official publication, as follows: Santiago, 291,725; Valparaiso, 135,674; Concepción, 49,766; Iquique, 42,440; Talca, 40,987; Chillan, 34,994; Antofagasta, 19,482; La Serena, 17,137; Talcahuano, 15,643; Curicó, 14,577; San Felipe, 12,359; Valdivia, 9,819; Copiapó, 9,586.

Climate and Productions.— The northern part of Chile is a hot desert; the southern part, a cold region of almost incessant rains; but between these extremes lies a great extent of territory blest with a temperate and healthful climate. Dividing the republic, for convenience of characterization, into five zones, we may say that in the northernmost zone there is a nearly absolute lack of vegetation, but yet we find here some of the chief sources of the national wealth — the deposits of nitrate of soda, mines, etc. The second zone, continuing toward the south, is less torrid. Rain falls several times in the year; and though mining is the chief industry, small areas are also devoted to agriculture. The third zone, in the centre of the country, has a temperate climate and fairly abundant rains. Cattle-raising, mining, and the cultivation of cereals, vines, and fruits are the leading industries. In the fourth zone, where

rains are more abundant and the climate cooler, the chief products are wheat, cattle, lumber, etc. The fifth and most southerly zone, extending to Cape Horn, is a land of bold and rugged features with a cold and rainy climate — a land of shepherds, lumbermen, and fishermen.

National Finances.— The national debt of Chile on 31 Dec. 1901, as shown in the report of the auditor-general of the republic, amounted to 302,672,280.91 pesos (Chilean peso = $0.365). Of this amount, 227,234,400 pesos were for foreign loans dating from the years between, and including, 1885 and 1894. A reduction of 2,896,607.26 pesos in the national debt was effected in 1901. The message of President Riesco (1 June 1902), shows that the revenue, ordinary and extraordinary, in 1901 amounted to 110,059,496.97 pesos. On 31 Dec. 1900 there remained a surplus of 18,576,829.43 pesos. These two sums make a total of 128,913,989.40 pesos. The total of expenditures in 1901 was 130,913,989.94 pesos. There was consequently a deficit of 2,277,663.54 pesos, which sum was increased by certain payments to 2,809,337.66 pesos. In 1902 the president anticipated a deficit of 29,719,339.31, "which may be reduced by 3,000,000 by certain economies, and almost totally met by the 20,000,000 in gold taken from the conversion fund and the premium paid upon this sum. The conversion fund will be made up again out of the sales of land in Magellan territory and of nitrate grounds." The estimated revenue for 1903 amounts to 107,000,000 pesos, and the estimated expenditure to 105,665,545.79 pesos. This somewhat unsatisfactory condition of the national finances may be traced to political events which will be mentioned under *History*. The foreign trade in 1901 amounted to 300,383,118 gold pesos, which which was the largest sum on record. Imports were 139,300,766 gold pesos; exports, 171,844,976 gold pesos, an increase of 10,223,079 gold pesos over 1900. Receipts of the custom-house amounted to 71,998,955 gold pesos, of which sum 27,872,696 gold pesos corresponded to imports and 44,126,259 gold pesos to exports.

Countries Leading in Trade with Chile.— The year 1901 cannot be regarded as normal in the matter of imports, the failure of the Chilean wheat harvest having occasioned an unusually large importation of wheat and flour in that year. Analyzing the figures for a normal year, 1899, we find that the five principal nations having commerce with Chile are:

Countries	Exports to in pesos	Imports from in pesos
Great Britain	110,528,378	44,338,050
Germany	20,921,999	29,748,898
France	9,334,281	5,525,162
United States	7,349,858	8,197,569
Peru	4,248,312	5,185,194

Of the Chilean products, which constituted the commerce of exportation, 84⅓ per cent belonged to mining; 10½ per cent to agriculture; 2½ per cent to manufactures; and the rest to various products and to coin. The imports of that year were classified as follows: Woolen goods, 29,058,119; raw material, 21,731,717; food-products, 17,696,659; manufactures, 14,032,630; machinery, 12,695,066; beverages and cigars, 1,268,099; sundry articles, 9,778,068.

Exports.—One of the principal exports is nitrate, the quantity and value of which has steadily increased during recent years. Chile, in fact, leads the world in the production of nitrate of soda, no other country being able to supply this mineral in commercial quantities. The value of the exported nitrate in 1899 was 96,650,282 pesos; in 1900, 109,945,156 pesos; in 1901, 118,860,131 pesos; and in 1902 there was a still more noticeable increase in the amount produced. Copper bullion is also exported in considerable quantities, the amount in 1901 being 24,479,922 kilos, valued at 19,627,114 pesos. A decrease is noted during recent years in the exportation of wheat, flour, and barley. In 1898 wheat to the value of 7,696,460 pesos was exported; in 1899, flour to the value of 996,979 pesos, and barley to the value of 2,246,866 pesos. Chile exported in 1901, honey valued at 1,034,088 pesos, and beeswax valued at 582,045 pesos; hay to the value of 260,815 pesos; wine, 68,344 pesos; and gold and silver coin, 13,150 pesos.

Mining.—Chile is the second largest silver mining country in South America, and the third largest copper producer in the world. In the northern zone, notably in the province of Antofagasta, extensive deposits of calcium borate are being worked. The annual exports from the manganese mines in Coquimbo and Atacama are between 20,000 and 25,000 tons. Other minerals, with amounts produced in the year 1900, are: Coal, 896,000 tons; iodine, 318 tons; and gold, 4,576 pounds. The nitrate of soda produced in that year weighed 1,465,935 tons.

History.— The dominion of the Incas of Peru included the northern and central portions of Chile — at least to lat. 37° S. In 1535 the Spanish conquerors of the Inca empire sent their first expedition southward along the Pacific coast; but the task of adding this territory to the Spanish possessions in Peru and Upper Peru (Bolivia) was not undertaken in earnest until 1541, nor was it brought to a successful conclusion before 1550. The courageous Araucanians offered a stubborn resistance to Valdivia's forces, and even as late as the 18th century they made good their prior claim to a large part of the country below lat. 37° S.

Independence and Adoption of Constitution.— In September 1810 was formed the first national government, to rule the country during the captivity of the king of Spain, whom the French held as a prisoner. From that time forward the design to achieve independence was never relinquished, though the events of the years immediately following were of a character to discourage patriotic aspirations. The Chileans were defeated and compelled to return to a nominal subjection; the final success was won with the help of Argentine troops under Gen. San Martin (see Argentina), and the independence of the country was proclaimed in 1818. A constitution, adopted in 1824, and remodeled in 1828, was given its final shaping — substantially the form which it still retains, though modifications demanded by the progress of the country have been made — in 1833. (See under *Government*.) Independence was recognized by a formal arrangement with Spain, and embodied in the treaty of 1844. In 1865, however, a war broke out between the mother country and Chile and Peru, hostilities continuing until 1869. After an interval of peace, the important "war on the Pacific" began.

The War on the Pacific.— For many years the rights of Bolivia and Chile, respectively, in certain mining lands bordering on the Pacific Ocean remained without definition, but in 1874

an agreement was entered into between the two countries which apparently disposed of the questions at issue. The exploitation of these lands by Chileans increasing, Bolivia saw fit to reopen the dispute by imposing an export tax on the nitrate, or "saltpetre," obtained in Bolivian territory. A Chilean company refused to pay the tax, alleging that it contravened the treaty of 1874. The Bolivian government's reply was an order for the sale by auction of the property of the offending company, on 13 Feb. 1879. Thereupon the Chilean government sent a man-of-war to seize the port of Antofagasta. It soon became apparent that Chile would be obliged to deal with Peru also in this matter; and in fact a secret offensive and defensive alliance against Chile had been formed by Bolivia and Peru in 1873. On 5 April 1879 Chile declared war against the latter republic. Tacna and the neighboring port of Arica were occupied by the presidents of Peru and Bolivia with their troops; the defense of Iquique was entrusted to a sufficient force, and at Lima a reserve of about 10,000 men was held in readiness to meet the Chileans at any point that might be attacked. The plans of the allies seemed to be well laid, and some initial successes fell to their share.

Capture of the Huáscar.— Two Chilean warships, the Esmeralda and the Covodonga, blockading Iquique, were attacked by the Peruvian frigate Independencia and the monitor Huáscar. The Esmeralda was sunk by the Huáscar, but the latter vessel on 18 October fell in with the Cochrane and Blanco of the Chilean navy north of Point Mejillones. A fight of great severity ensued. Only 86 men were left alive on board the Huáscar, out of her complement of 216, when she was obliged to surrender. This vessel was repaired and added to the Chilean navy.

Triumph of Chile.— Pisagua was captured from the Bolivians by Chilean warships. On 18 Nov. 1879, the allies were defeated in the battle of San Francisco, but before the close of the same month they scored a dearly bought success against the Chilean forces in the battle of Tarapacá. Chilean divisions commanded by Gen. Baquedano invested the town of Moquegua, and on 23 March 1880 entered Torata. Two months later a decisive contest occurred, the city of Tacna (now the capital of the Chilean province of that name) being taken on 26 May. The troops of the allies, including 5,120 Peruvians and 3,200 Bolivians, commanded by Admiral Montero, and the Bolivian president, Gen. Campero, sustained a crushing defeat. Arica, the port of this district, was attacked by the land and sea forces of Chile in June, and fell after making a desperate resistance. In order to emphasize the defeat and to cripple the more important members of the alliance, the Peruvian coast was laid waste, Mollendo was destroyed, Callao and other ports blockaded, and an expedition under Baguedano's command made ready to proceed to Lima. See PERU.

Acquisition of Territory.— As the fruits of her victory, Chile took from Bolivia the districts of Cobija and Atacamá; from Peru the coast line north of the Bolivian possessions to, and including, conditionally, the province of Tacna. Thus Chile's territory on the Pacific was extended northward from the old boundary, at lat. 24° S. One of the allies was cut off from communication with the outside world by way of the Pacific Ocean; and a strategic frontier was established against the other ally. A truce, instead of a treaty, was concluded between Bolivia and Chile after the war, the sentiment of the Bolivians being utterly averse to any permanent arrangement which did not give them access to the sea. Renewal of negotiations for a definitive treaty, which should include the concession of a seaport, has been repeatedly urged by Bolivia, but hitherto without effect.

Treaty of Ancon.— Peru, by the terms of the treaty of Ancon (1883), surrendered to Chile absolutely the valuable nitrate district of Tarapacá, but with respect to the Tacna-Arica region a peculiar convention was made. It was agreed that Tacna-Arica should be governed by Chile for a period of 10 years, and that at the end of the decade the vote of the inhabitants should decide whether it would be better for the province to revert to Peru or to be administered by Chile in the future — the country thus rejected by popular vote receiving from the other country $10,000,000 silver by way of compensation. Nearly 20 years have passed, and the Peruvian government has repeatedly urged fulfilment of the treaty, but the plebiscite has not yet been held.

Balmaceda.— Some of the amendments to the constitution which we have referred to above were adopted before the outbreak of the war with Peru and Bolivia; they embodied the liberal ideas which, in 1874, triumphed over the conservation of the proprietors of large estates — a class practically dominating the government's policy up to that time. The most forceful of the liberal leaders who effected this important political change was Balmaceda, a member of Congress in 1868, minister to the Argentine Republic at the time of the war with Bolivia and Peru, and, in 1885, elected to the presidency of the republic. The conspicuous success of President Balmaceda in his advocacy of measures relating to internal improvements, a system of popular education, the separation of Church and state, etc., created bitter antagonisms. United in opposition to him were all those who disapproved of his vigorous liberalism on principle, and all who were jealous of his power as an individual. In 1888 his cabinet was overthrown; his unyielding attitude in this crisis provoked an armed revolt; and the country was plunged into civil war, the operations of the forces of the revolutionists being directed by a junta representing Congress, and the president somewhat too readily assuming the powers of a dictator for the defense of his position. Balmaceda was defeated, and died by his own hand on 19 Dec. 1891.

The effect of this civil war upon Chile's foreign credit was deplorable. With characteristic enterprise her people have developed the resources of the country in many new directions, yet the utmost wisdom and firmness in the administration of her government have been required to bring about even such conditions of the national finances as we have stated. On the other hand, the country was fortunate in escaping a serious foreign war.

The Baltimore Incident.— The opinion prevailed in Chile when this conflict was at its height that the United States government, through Minister Patrick Egan, was showing favor to the cause of Balmaceda, and discriminating against the congressional party.

The fierce resentment felt by the latter expressed itself in an attack upon sailors of the United States cruiser Baltimore, who became involved, while on shore, in a brawl with Chilean sailors. There was a riot of the populace in the streets, and several of the Baltimore's men were seriously or mortally wounded. When a report of this indignity reached Washington, suitable representations were made by the authorities there, but unfortunately it was necessary to address such representations to a merely provisional government at Santiago. The latter not only refused the just demand for satisfaction, but also insisted in offensive terms that the men who had been assaulted should be handed over to Chile for trial as criminals. An improvement in this threatening situation occurred when the management of Chilean affairs was entrusted to President Montt, and when the demand of the United States was emphasized by the sending of two additional warships to Chile. The new president tendered apologies for the discourtesy of the provisional government, as well as for the attack upon men wearing the uniform of the United States; and compensation was made to the wounded sailors, or to the families of those who had died.

Arbitration and Limitation of Naval Armaments.— On 28 May 1902, the plenipotentiaries of Chile and the Argentine Republic concluded two important agreements, the first of which provides for the arbitration of all questions not affecting constitutional precepts, or that cannot be settled by direct negotiations. It is entitled a "General Treaty of Arbitration," and the desire is expressed in its introductory clause "to settle by friendly methods whatever questions may arise between the two countries." The second agreement is entitled a "Convention on Naval Armaments," which has "the object of removing all causes of anxiety and suspicion." The two governments "renounce the acquisition of the war vessels they have in construction and the making for the present of any new acquisitions"; agreeing, moreover, to reduce their respective fleets until they arrive at "a prudent equilibrium." In this connection we note that the launching of the first iron steamer built in Chile took place on 24 Nov. 1901 at Valparaiso. The entire ship, from keel to truck, was of domestic construction.

Government.— The national Congress is composed of two chambers: (1) The chamber of senators, with 32 members, elected for a term of six years by direct vote and by provinces, in the proportion of one senator to each three deputies; (2) the chamber of deputies, with 94 members, elected for a term of three years. Congress exerts a certain amount of control over the president of the republic by giving or refusing its confidence to the cabinet ministers appointed by him — as illustrated in the contest with Balmaceda. To represent Congress in the period of its recess, there is a Permanent Committee of 14 members, one-half chosen by each chamber.

The president of the republic holds office for five years, and he cannot be re-elected for the next consecutive period. A council of state, composed of 11 members, some of whom are appointed by the president, and others by the chambers, has the power to intervene in certain appointments, and its consent is necessary for the promulgation of the laws, the granting of pardons, and some other matters. This council is not to be confused with the cabinet, in which are but six ministers or secretaries, to wit: The minister of the interior; of foreign affairs; Church, and colonization; of justice and public instruction; of war and the navy; of the treasury; of industries and public works.

The judicial branch of the government comprises: The supreme court of justice, located at Santiago, and composed of seven members, with authority over all other tribunals of the republic; the court of appeals, for the great districts of Tacna, Serena, Valparaiso, Santiago, Talca, and Concepción; one or more justices of the peace in each department of the republic; and sub-delegation or minor district judges. Juries exist only for suits involving the question of abuse of the freedom of the press.

For the purposes of political government, Chile is divided into 23 provinces and one territory. The provinces are divided into departments, the departments into sub-delegations, and the latter into districts. For the purposes of local administration, the republic is divided into municipal circumscriptions, or communes, one for each 20,000 inhabitants. A list of the provinces follows, beginning at the north: Tacna, Tarapacá, Antofagasta, Atacama, Coquimbo, Aconcagua, Valparaiso, Santiago, O'Higgins, Colchagua, Curicó, Talca, Linares, Maule, Ñuble, Concepción, Bio-bio, Arauco, Malleco, Cautin, Valdivia, Llanquihue, and Chiloé. The territory referred to above is Magallanes, at the southern end of the continent.

Education.— In 1901 there were 1,700 public schools, with 124,265 names of scholars on the books, and an average attendance of 79,666. During the first six months of 1902, there were opened 88 new schools and three new lyceums. The University of Chile in its various departments (including law, engineering, medicine, theology, and the fine arts) has an attendance of 1,300. Other public educational institutions are: The National Institute, with 1,200 pupils; Institute of Pedagogy; about 30 lyceums of secondary instruction for men; and 15 lyceums for girls; 6 normal schools; a Conservatory of Music; a Commercial Institute; also schools of fine arts, agriculture, arts and trades, mining, for the blind and for deaf-mutes, professional schools for girls, and industrial schools. Private educational establishments are numerous and receive pupils from other Latin American countries. The Roman Catholic University has courses of engineering and law. There are several museums of natural history and fine arts; an Astronomical Observatory, and meteorological observatories; botanical gardens, and, in various parts of the country, 41 public libraries, with 240,000 volumes.

Army and Navy.— By the law of 31 Dec. 1896 the maximum strength of the active army was placed at 9,000 men, and in 1899 the effective strength of the active army was stated to be 6,987 men; nevertheless a system of military instruction and drill is enforced which practically renders a much larger number available for military service in an emergency — possibly 10 regiments of infantry, 6 of artillery, 8 of cavalry, and one of military engineers. Establishments for military instruction are the Academy of War, the Military School, and the School for Sergeants and Corporals. The Chilean navy includes nearly 40 vessels of various classes:

the armor-clad Capitan Prat, O'Higgins, and Almirante Cochrane; the monitor Huáscar; five protected or armored cruisers; five gunboats and torpedo-cruisers; four destroyers; 13 torpedo-boats; a training ship, etc. Naval instruction is given on board the vessel last mentioned, as well as in the academy at Valparaiso.

Railways, Postal Service, etc.— The state railways in operation in 1901 had an extent of 1,420 miles, and private railways 1,430 miles. Including several hundred miles which have been constructed since that time, we may say that there are somewhat more than 3,000 miles of railway in the republic; and the interesting statement is made that, although the government lines transported nearly 6,500,000 passengers and 2,500,000 tons of freight in 1899, "the net product was small, because rates are kept very low, for the purpose of promoting the public wealth by facilitating intercourse and the interchange of products." All the more important cities have street railways.

There are about 740 post-offices, and the total delivery in 1899 was 40,000,000 pieces. Newspapers, reviews, and other periodical publications are circulated free of postal charges, in the interest of the public education. The telegraph service is chiefly performed by the state, the private lines being only about 2,800 miles in extent, out of a total of 14,000 miles. Two lines of underground cables cross the Andes, and there are two submarine cables. Telephone companies have about 15,000 miles of wires in operation in the larger towns.

Agriculture, and Various Industries.— There are approximately 6,200,000 acres under cultivation, while the total area of arable land is probably not less than 25,000,000 acres. The production of wheat in good seasons is about 22,700,000 bushels, and of barley about 4,250,000 bushels. Other grains, fruits, and vegetables are raised in large quantities in the central provinces. The cultivation of the vine has received much attention during a score of years; in fact, this industry ranks next to cattle-raising in certain districts. Even the island of Juan Fernandez (made famous by Defoe's story of 'Robinson Crusoe') is included in the plans for industrial development. This island, lying 600 miles west of Valparaiso, belongs to Chile, and arrangements are being made quite seriously for turning to some good account the interesting little possession.

Milling holds the first postion among Chile's manufacturing industries. More than 500 flour mills, supplied with the most modern machinery, are in operation in different parts of the country, especially the provinces lying south of the capital. Wood-working and tanning, and the manufacture of woolen cloth, building materials, and coarse paper are also worthy of mention.

Bibliography.— Allendes, (E.) 'Revolution of 1891 in Chile'; Barros Arana, 'Histoire de la guerre du Pacifique'; 'La cuestion de limites entre Chile i la República Argentina'; Bertrand, 'Estudio técnico, etc., Santiago'; Bureau of American Republics, Monthly Bulletin, Washington 1902, 1903; Child, 'Spanish-American Republics'; 'Chile and Spain: the Whole Question Officially Stated'; 'Coleccion de tratados celebrados por la republica de Chile'; Dundonald, 'Narrative of Services in the Liberation of Chile, Peru, and Brazil' (2 vols.); Egaña, 'The Tacna and Arica Question'; Hall, 'Extracts from a Journal, etc.'; Lastarria, 'Investigaciones sobre la influencia social de la conquista'; Markham, 'The War Between Chile and Peru'; Medina, 'Coleccion de documentos inéditos para la historia de Chile'; 'Memoria (dal ministro de Justicia e Instruccion Publica)'; 'Message of the President of the United States Respecting the Relations with Chile, with the Diplomatic Correspondence, etc.' (Washington 1892); 'Pan-American Exposition (Chile at the), Brief Notes, etc.'; Santa Maria, 'Memoria sobre los sucesos . . . caida de D. Bernado O'Higgins en 1823 hasta la promulgacion de la constitucion, etc.'; 'Statutes. Coleccion de códigos de la Republica de Chile'; Treutler, 'Fünfzehn Jahre in süd-Amerika, etc.'

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Chile Saltpetre. See NITRATE OF SODA.

Chi-Li, or Chih-Li, China, one of the 18 provinces into which the country proper is divided. It has an area of 58,949 square miles and is bounded north by Mongolia, east by the gulf called Pe-Chi-Li, and by the province of Shang-Tung, and west by the province of Shan-Hsi. Chi-Li is in many respects the most important of the Chinese provinces, containing as it does the imperial capital, Peking, the treaty port of Tien-Tsin, and the only completed line of railway in the empire. The Great Wall runs across the whole of the northern part of Chi-Li, while on the coast are the forts of Taku, and the nearest approach to a naval station belonging to the Chinese government. The province is mountainous and traversed by important rivers, notably the Pei-Ho, the Lan, the Ho-Kien, and the Hu-to. The Yu-Ho is especially important because of the canal system developed throughout its course in Chi-Li. The provincial administration is in charge of a viceroy (Tsoung-tou) and a Fou-youen or subgovernor. There are numerous towns of the first, or Fu, class, second, or Chou, class, and third, or Hien, class. These towns are surrounded by walls. There are Christian missionaries of many denominations throughout the province. In 1900 the population was estimated at 25,000,000, including a large Manchu element. They are generally engaged in commerce, Chi-Li having much communication with Russia by way of Siberia. The climate is at times severe, the Pei-Ho being generally frozen over from December to March.

Chiliasm, kĭl'ĭ-ăzm, the belief that Christ will come to earth and rule the world from Jerusalem for 1,000 years. The Latin word millennium means the same thing. The Revelation of John is the chief authority of the Chiliasts. Papias, Justin Martyr, Irenæus, Tertullian, and Lactantius were Chiliasts, but Origen was opposed to the notion. Papias, bishop of Hierapolis, says, in the millennium every vine will bear 10,000 branches, every branch 10,000 shoots, every shoot 10,000 sprigs, every sprig 10,000 bunches, every bunch 10,000 berries, and every berry 36 times 25 gallons of wine; and if a saint comes to pluck a berry it will cry out, "Pluck me, O saint; I am better for being plucked, praise the Lord." The Fifth Monarchy Men were, of course, Chiliasts, only they maintained that the golden age had begun, and that they were of it.

Chilkat (chĭl'kăt) **Inlet,** the western arm of Lynn Canal, an inlet in Alaska, in about lat. 50° 7′ N.

Chilkat, or **Dalton, Pass,** a route in Alaska traversed by miners in reaching the gold fields of the Klondike. It is an overland trail, which was used for many years by J. Dalton, a trader, as a pack train route and for driving in cattle. It follows a direct course, more or less independent of waterways, from Chilkat Inlet to Fort Selkirk, and is said to be less difficult than the road over Chilkoot Pass.

Chilkoot (chĭl'koot) **Inlet,** the eastern arm of Lynn Canal, an inlet in Alaska. It is again subdivided, its principal arm being called Taig, an inlet which stretches for 15 miles north and south in about long. 135° 20′ W.

Chilkoot Pass, a pass over the mountains in the northern part of Alaska, traversed by thousands of gold-seekers in the Klondike gold fields' excitement in 1897–8. By way of the Chilkoot Pass is the most direct route to Dawson City, the principal starting point to the Klondike region. The trail starts from Dyea, along the river of that name, and crosses the Pass at an elevation of 3,500 feet, to the head of Lake Lindeman, a total distance of 28½ miles. From the latter place to Dawson City is 548 miles. The Chilkoot Pass route is the old trail used for generations by the Indians, and for many years was the only one taken by miners and prospectors to reach the interior. It is by far the shortest route to the Yukon. The difficulties and dangers attending this route are many, and the steepness and roughness of the ascent have proved fatal in numerous instances, to those unaccustomed to endure hardships. The summit of the Pass is 13 miles from Dyea, the first six miles being traversed by a good wagon road. Owing to the winding of the Dyea River that stream must be crossed several times by ford or ferry. The trail then enters a narrow cañon with steep, rocky sides, which it follows to Sheep Camp, four and a half miles farther on, which point is the timber line. From Sheep Camp to the summit the rise is from 1,800 feet in three and a half miles, to 1,000 feet in half a mile, and here masses of broken rock make the ascent, which is in some places almost perpendicular, difficult and hazardous. It is at this point that the aërial tramway is built.

Chillan, chēl-yän′, Chile, capital of the province Ñuble, about 75 miles northeast of Concepcion. It consists of an ancient and a modern portion, the former built by the Spanish conquerors, who made it a place of some strength, in which the early settlers often found an asylum when hard pressed by the Araucanians. The old town was founded in 1579, and destroyed by an earthquake in 1835. The new town was built shortly after the latter date. Pop. 29,000.

Chilled Iron, iron cast in metal molds called chills, where, on account of the rapid conducting of the heat, the iron cools more quickly on the surface than it would do if cast in sand. Chilled iron is whiter and has a harder surface than iron cast in any other way. It is used in making axle-boxes, hubs, plowshares, and some hammers and anvils.

Chillianwalla, chĭ-lĭ-an-wäl'a, a village of the Punjab, about five miles from the left bank of the Jhelum, 85 miles northwest of Lahore, famous for a well-contested battle fought in its vicinity, in 1849, between the British under Lord Gough and the Sikhs, in which the former, though they remained masters of the field, lost 2,269 men. A second battle fought about six weeks after, at Gujerat, nearly annihilated the Sikh force.

Chillianwalla, Battle of, an engagement in India between the Sikh forces in considerable strength, and the British commanded by Lord (afterward Viscount) Gough, fought 13 Jan. 1849. The Sikhs were completely routed, but the loss of the British was very severe: 26 officers were killed and 66 wounded, and 731 rank and file killed, and 1,446 wounded. The Sikh loss was 3,000 killed and 4,000 wounded. On 21 February, Lord Gough attacked the Sikh army, under Shere Singh, in its position at Goojerat, with complete success; and the whole of the enemy's camp fell into the hands of the British.

Chillicothe, chĭl-lĭ-kŏth'ē, Mo., a city and county-seat of Livingston County; on the Wabash, the Chicago, Milwaukee & St. P., and the Hannibal and St. J. R.R.'s, 70 miles east of St. Joseph. It is a farming trade centre and has several manufacturing industries. It is the seat of the Chillicothe Normal School, State Hospital, State Industrial School for Girls, and St. Mary's Hospital, and is near the noted health resort, Laurel Mineral Springs. It has several daily and weekly newspapers, electric lights and street railroads, and two national banks. Pop. (1900) 6,905.

Chillicothe, Ohio, city and county-seat of Ross County, on the Scioto River, Point Creek, the Norfolk & W., the Cincinnati, H. & D., and the Baltimore & O. R.R.'s, and the Ohio & Erie Canal, 50 miles south of Columbus. It is an agricultural and coal-mining region, and has flour mills, foundries and machine shops, daily and weekly newspapers, three national banks, and an assessed property valuation of $6,000,000. Chillicothe was the first capital of the State. Ohio celebrated in May 1903, her 100th birthday as a State, and it was peculiarly fitting that Chillicothe should have been chosen as the place for the celebration, for all the historic memories of the early years of the State's existence cluster about this city. It was here that Gen. Arthur St. Clair set up his Territorial government, as governor of the Northwest Territory; it was here that the agitation for Statehood gathered momentum, led by a quartet of Chillicothe men — Thomas Worthington, Nathaniel Massie, Edward Tiffin, and Duncan McArthur. It was here, on 29 Nov. 1802, that a constitution for the State was adopted, in compliance with the requirements of the Federal Constitution; and, finally, it was here, in the spring of the succeeding year, that the young State was ushered into being and Edward Tiffin elected her first governor. Pop. (1900) 12,970.

Chil'lies, the fruits of the Capsicum, used to make cayenne pepper, pickles, and chilli vinegar. See CAYENNE PEPPER.

Chil'lingham White Cattle. See WHITE CATTLE.

Chil'lingworth, William, English Anglican divine and controversialist: b. Oxford October 1602; d. Chichester, Sussex, 30 Jan. 1644. He was matriculated in Trinity College, Oxford, in 1618, and in 1628 was made a Fellow of the same college. Having been won to the Roman Catholic Church through the arguments of the Jesuit Father Fisher, Chillingworth entered the English College at Douai, where Laud, then bishop of London, by correspondence implanted in his mind doubts regarding the foundation of the Roman Catholic system; and, resolved to make a thorough investigation, Chillingworth returned to England after a few months abroad. The result was that he declared for Protestantism and in 1634 set forth, in a treatise that was not published and is now lost, the grounds of his conclusion. Laud procured his nomination to a church benefice in 1635, but Chillingworth's scruples about subscription to the 39 articles and acceptance of the Athanasian creed was an obstacle that could not then be overcome. In 1637 was published his great work, 'The Religion of Protestants: a Safe Way to Salvation.' In the preface he explained away his former scruple about the 39 articles, and the next year was named chancellor of Sarum with a prebendaryship annexed. When Gibbon in his autobiography explains his own religious experiences, which closely resemble those of Chillingworth, he insinuates that the reconverted convert afterward repudiated privately the cardinal doctrines of the Church of England.

Chillon, shē-yôn or shĭl'ŏn, a castle, Switzerland, on the Lake of Geneva, 6½ miles southeast of Vevay, once an important stronghold of the counts and dukes of Savoy, and the prison-house of Francis Bonivard, prior of St. Victor, Geneva, from 1530 to 1536. It stands on a rock rising 22 yards from the shore of the lake, and is reached by a bridge. It probably dates from the 9th century. Bonivard was confined in it by the Duke of Savoy because he had assisted the republic of Geneva, with which the Duke was at enmity. Byron's poem, 'The Prisoner of Chillon,' founded on this incident, has made it well known.

Chilo, kī'lō, one of the seven wise men of Greece. See CHILON.

Chiloe, chē-lō-ā', Chile, province of, consists of the island of that name on the west coast, which is separated from the mainland by a narrow strait on the north and by a gulf 30 miles wide on the east, and has a length of 115 miles, and an extreme breadth of 43 miles, and of a number of neighboring islets, mostly uninhabited; total area, 3,995 square miles; almost all Indians living on the principal island. Chiloe proper is hilly in the interior, and everywhere covered, except immediately along the shores, with nearly impassable forest. The climate is mild and not unhealthy, although inordinately wet. The Indians belong to a subdivision of the Araucanian family; they are a gentle and honest race, mostly engaged in fishing and in lumbering, timber being at present the chief export from the island, though immense deposits of coal have been reported. Oysters, which are very scarce elsewhere in South America, are found in large quantities in the Chiloe Archipelago. The potato here, as in other parts of South America, grows wild. The capital, Ancud, on the north coast, has a good harbor, is the seat of a bishop, and has a population of (1895) 3,182. Pop. of province, 82,362.

Chilognatha, kī-lŏg'na-thạ. See DIPLOPODA; THOUSAND-LEGS.

Chilon, kī'lŏn, one of the so-called seven wise men of Greece. He flourished about the beginning of the sixth century B.C., and was a native of Sparta, and one of the Ephori, a body of magistrates which he is even said to have originally introduced. A collection of his sayings may be seen in Orelli's 'Opuscula Græcorum sententiosa' (1819).

Chilopoda, kī-lŏp'ō-dạ, a group of myriapods represented by the centipede (q.v.). In these animals the body is composed of from a few to between 100 and 200 segments; the body is flattened, and there is but a single pair of legs to each segment. There are three pairs of mouth-appendages,— that is, a pair of jaws succeeded by two pairs of accessory jaws; while the first pair of legs are modified to form the poison fangs, which contain at their base a poison sac, the ducts from which open by a minute pore, out of which the blood oozes when the creature bites. The *Chilopoda* are divided into four families,— *Lithobiidæ, Scolopendridæ, Geophilidæ,* and *Scutigeridæ.*

Chilperic, chĭl'pĕ-rĭc, two Merovingian kings: 1. CHILPERIC I., king of Soissons: d. 584. He never was acknowledged king of all the Frankish land, but divided the kingdom with his three half-brothers; he had, however, great power throughout their dominions by reason of his influence with the nobles. The murder of his wife, Galswintha, involved him in a war with her brother-in-law, Siegbert of Austrasia. 2. CHILPERIC II., king of Neustria: d. 720. He was several times at war with Charles Martel (q.v.), but was forced to submit to him, and was in 719 made king of the Franks.

Chil'tern Hills, a range of flint and chalk hills in England, extending through Oxford, Hertford, and Buckingham shires; loftiest summit, 905 feet. These hills were anciently covered with forests, and were infested by numerous bands of robbers. The steward of the Chiltern Hundreds is an officer of the Crown, appointed to protect the people of Bucks from the robbers of the Chiltern Hills. This office is now a sinecure, but as a member of Parliament can only resign his seat by accepting office, he accepts this sinecure, which he immediately vacates for the benefit of others. The stewardship of the manors of East Hundred, Northshead, and Hempholme, are other sinecure offices made use of for the same purpose.

Chiltern Hundreds. See CHILTERN HILLS.

Chil'ton, Robert Hall, American soldier: b. London County, Va., 1817; d. Columbus, Ga., 18 Feb. 1879. He graduated at West Point 1837; became captain of the First Dragoons 6 Oct. 1846, and was brevetted major for gallant and meritorious conduct at Buena Vista, Mexico, 23 Feb. 1847. In this battle Jefferson Davis, afterward president of the Southern Confederacy, but then colonel of the First Mississippi

Rifles, was severely wounded, and Chilton bore him from the field, a life-long friendship resulting from the event. He became a brigadier-general in the Confederate service 20 Oct. 1862, was chief of staff to Gen. Lee, and inspector-general of the Army of Northern Virginia. After the war he was engaged in business in Columbus, Ga.

Chimæra, kī-mē'ra, in classic mythology, a monster, breathing flames, with the head of a lion, the body of a goat, and the tail of a dragon, which laid waste the fields of Lycia, and was at last destroyed by Bellerophon, with the help of Pegasus. Her form is described by the poets as an unnatural mixture of the most incongruous parts. Therefore the name of chimæra is used for a nondescript, an unnatural production of fancy. According to some Chimæra was a volcano in Lycia, around the top of which dwelt lions, around the middle goats, and at the foot poisonous serpents. Bellerophon is said to have been the first who rendered this mountain habitable.

Chimæroidea, one of the primary divisions of fishes, the equivalent of *Holocephali* (q.v.).

Chimango, shē-măn'gō, a carrion hawk of South America (*Ibycter chimango*), closely related to the Caracara (q.v.) The plumage is black, with whitish streaks on neck and breast in the adult, which are lacking in the young. These birds are particularly numerous in the Falkland Islands. Darwin describes them as without fear of man, frequenting inhabited regions and feeding on all kinds of refuse.

Chimborazo, chēm-bō-rä'sō or chĭm-bō-rä'zō, Ecuador, a peak of the Andes, in the province of Quito. Though not the loftiest summit of the Andes, it rises 20,700 feet above the sea-level, and its top is covered with perpetual snow. Through the transparent air it presents a magnificent spectacle from the shores of the Pacific. This mountain was ascended in 1802 by Humboldt and Bonpland, who, though they failed to reach the summit, yet mounted to the great height of 19,390 feet, a greater elevation than ever was before attained by man. Their further ascent was prevented by a chasm 500 feet wide. The air was intensely cold and piercing, and owing to its extreme rarity blood oozed from their lips, eyes, and gums, and respiration was difficult. In 1880 the summit was reached for the first time by Mr. E. Whymper.

Chimere, shĭ-mēr', the upper robe to which the lawn sleeves of a bishop are attached. In the Roman Catholic Church it is of purple silk, and of black satin in the Church of England.

Chimes, music mechanically produced by the strokes of hammers against a series of bells, tuned agreeably to a given musical scale. The hammers are lifted by levers acted upon by metallic pins, or wooden pegs, stuck into a large barrel, which is made to revolve by clock-work, and is so connected with the striking part of the clock mechanism that it is set in motion by it at certain intervals of time, usually every hour, or every quarter of an hour. The music thus produced may consist of a direct succession of the notes constituting an octave, frequently repeated, or it may be a psalm tune or short popular air in the key to which the bells are tuned. This species of mechanical music most probably had its origin, like clock-work itself, in some of the monastic institutions of Germany, in the Middle Ages. The first apparatus for producing it is said to have been made at Alost, in the Netherlands, in 1487. The chime mechanism may be adapted to act with the large bells of a church steeple, by means of wheel-work strong enough to raise heavy hammers; or a set of bells, of different diameters, may be arranged concentrically, within one another on one common axis, sufficiently small to be introduced into the frame of a clock, or even of a watch. The chime mechanism is sometimes so constructed that it may be played like a piano, but with the fist instead of the fingers. This is covered with leather, that the blow on the key may be applied more forcibly. Difficult as the performance is, some players can execute compositions consisting of three parts, and even produce trills and arpeggios. Burney relates that the chime-player Scheppen, at Louvain, laid a wager with an able performer on the violin that he would execute a difficult solo for the violin with the bells, and won his wager. Potthoff, organist and chime-player at Amsterdam, played his bells with the facility of a performer on the pianoforte, although every key in his apparatus required a force equal to a two-pound weight. Burney heard him perform some fugues in 1772. The finest carillons or sets of musical bells are to be found in Belgium, at Bruges, Ghent, Antwerp, Namur, and Mechlin. These consist of from 40 to 50 bells, the largest weighing several tons, the smallest only a few pounds. Instead of bells, sometimes bars, wires, or tubes are used.

Chim'ney, an upright structure of stone, brick, etc., enclosing one or more flues or passages through which smoke and gas from the fire in a stove, furnace, or fireplace may escape into the open air. How far the Greek and Roman architects were acquainted with the construction of chimneys such as we have is a matter of dispute. That kitchens and baths were provided with chimneys appears certain, but how far other apartments were so provided is doubtful. An ancient mosaic found in Algeria, and representing a Roman country mansion, shows chimney stacks projecting above the roof. Of course in southern Europe fires are less necessary than in northern Europe. Chimneys require much attention to make them secure and prevent their smoking, so great an annoyance to domestic comfort. It seems at present to be acknowledged that it is much better to exclude the cold, damp air from the flues, by narrowing the aperture at the top, than to give larger vent to the smoke at the risk of admitting a quantity of air to rush down the flue. For this reason chimney pots are of great use. In Prussia, where the architectural police is strict, great attention is paid to the erection of chimneys, and to the regular sweeping of them, the chimney-sweepers being bound to sweep the chimneys of a certain number of streets within a regular time. The longer a chimney the more perfect is its draft, because the tendency of the smoke to draw upwards is in proportion to the difference of weight between the column of air included in a chimney, and an equal column of external air; and the heated air in the chimney being lighter

than the external air, the longer the chimney is the greater is this difference. Short chimneys are liable to smoke, and fireplaces in upper stories are therefore more apt to smoke than those in the lower ones. Two flues in the same chimney should not communicate with each other short of the top. In manufactories tall chimneys are built for the purpose of carrying away the great quantities of smoke, which would otherwise be highly deleterious to the health of those living in the neighborhood. In chemical works, especially, these chimneys are sometimes built to an immense height. Such chimneys are now built from the inside, by which the expense of the scaffolding is saved.

Chimney-swallow, a species of swallow (*Hirundo rustica*) so-called because of its habit of selecting chimneys and similar sites for its nests. The bird covers the whole of Europe and extends into China, and is one of the most common of the bird kingdom throughout the world, for it has relatives in Africa and America, where the chimney-swift is recognized as belonging to the same group. See SWIFTS.

Chimoio, Africa, a town in the Portuguese possessions, near the border of Mashonaland, 118 miles from Beira on the coast. A railway connects it with Fontesvilla, 28 miles northwest of Beira, and is being continued inland to Salisbury.

Chimpanzee, chĭm-păn'zē or chim-păn-zē', an anthropoid ape (*Anthropopithecus niger*), native in the equatorial region of Africa. In size it is between the orang and the gorilla, although when seen it exhibits little of its stature, for it rarely stands upright, its habitual attitude being that of a bent creature, supporting itself on its long forearms. As the chimpanzee is arboreal in its habits, its hands and feet are larger, in proportion, than those of other apes, and this enables it to climb to the topmost branches of the great trees for soft fruits and insects, birds' eggs, and similar fare. The appetite for fruits makes the chimpanzee a menace to the plantations, especially when bananas are in edible condition. The natives guard the plantations, and as the animal is timid toward man this usually saves the crop; but when he cannot run away, the chimpanzee at bay is a formidable foe, using his long, sinewy arms and sharp teeth with deadly effect. He is even said to be a match for the leopard.

The habits of chimpanzees are largely nocturnal, and their long-drawn, loud, and terrifying cries may be heard at great distances. In the black recesses of the jungles, these cries would serve as calls to stragglers of the troop, and might also, by their suggestion of large numbers, scare away enemies. The nests whereon the females rest when bringing forth and rearing their young, are platform-like structures, built high in the tree-tops; these are deserted as soon as the young one is able to travel.

Chimpanzees are more nearly human in their action and intelligence than any of the other large apes, and many experiments have been tried in training and teaching them. Indeed, they have been made the subject of careful psychological investigation in various ways. They are playful and amusing, and exhibit none of the facial sombreness and ferocity of the gorilla, which they so closely resemble in structure.

The skin on the face of the chimpanzee is naked, yellowish in color, and surrounded by the long black hair which hangs about the head and shoulders. The body is covered with shorter, but equally shining black hair.

Various records are extant as to the training and habits of famous specimens of this species, kept under observation in various zoological gardens. Consult: Hartmann, 'Anthropoid Apes' and general works on natural history. See APE; GIBBON; GORILLA; ORANG-UTAN.

Chin-fly, a horse bot-fly (*Gastrophilus nasalis*) which has been confused with the horse-bot (*G. equi*). This species is smaller than the bot, densely hairy, with the thorax rust-colored. The abdomen is whitish at base and the wings are not spotted. It deposits its white eggs on the hairs about the lips or in the nostrils of equine animals, within easy reach of the tongue, and it is probable that the maggots hatch out more promptly than in the other species. It has been found common and troublesome in Kentucky. Also, in Europe it is a parasite of the ass, mule, and goat. See BOT-FLY; HORSE BOT-FLY.

Chin-Kiang, chĭn-kē-ăng', or **Chin-Kiang-Foo,** a city of China, in the province of Kiang-Su, on the right bank of the Yang-tse-Kiang, near the junction of the Imperial Canal, 150 miles from Shanghai. In 1861 it was made a treaty port. It is advantageously situated for trade, as the river is navigable for large vessels. Extensive suburbs stretch along the river and the canal. Chin-Kiang forms the key of the empire, as the blockade of the river and canal at this spot would in a great measure prevent all communication between the north and south. The city was formerly fortified, but has been dismantled. In 1842 it was taken by the British after a determined resistance on the part of the Manchu garrison. It was also taken by the Tai-ping in 1853. They defeated the Imperialists here on 1 Jan. 1856, and finally abandoned the city in 1858. Cotton goods form the chief import, and the exports are numerous and valuable. Pop. 200,000.

Chin-Wang, chĭn'wăng', a city of China, in the province of Chi-Li. It was declared a treaty port and opened to foreign commerce in 1898. Pop. (1900) estimated 39,000.

China, or **Chinese Empire,** an immense territory, stretching from the centre to the eastern extremities of Asia, and occupying nearly a third of the surface of that continent; between lat. 18° 20′ and 56° N., and lon. 73° and 135° E.; bounded north by Siberia; west by Russian Turkestan, the Russian Pamir, Cashmere, etc.; south by India, Burma, Anam, and the China Sea; east by Siberia, Korea, and portions of the North Pacific Ocean (Eastern Sea, and Yellow Sea); greatest length, west to east, about 3,000 miles; greatest breadth, 2,400 miles; area, about 4,300,000 square miles. This vast empire is usually divided into China Proper, which forms its nucleus, and the following Dependencies:

Manchuria (Chinese, *Tung-san-Sheng*) comprises the extreme northeast portion of the Chinese empire. It is bounded on the north by the river Amur and Russian territory, east by the Russian maritime province, west by Mongolia, and south by the Gulf of Liao-Tung and Korea. It is divided into the three provinces

Mukden, Hei-lung-Kiang, and Kirin, the respective capitals of which are Mukden, Tsitsihar, and Kirin. The total area is 280,000 square miles. *Mongolia* is the name given to the vast stretch of desert land which, interspersed with infrequent oases, stretches across the greater part of the north of China along the Siberian frontier. A large part of its area of 1,288,000 square miles is taken up by the Gobi desert. The population is almost entirely nomadic. The chief town is Urga. *Eastern* or *Chinese Turkestan* is a mountainous region lying between the western tract of the Gobi desert and the Pamirs, and enclosed north and south by the ranges of the Tian-Shan and the highlands of Cashmere and Tibet. It possesses an area of 431,000 square miles. The principal towns are Kashgar and Yarkland. *Sungaria* or *Dzungaria*, the smallest of the tributary states of China, lies to the northwest of Turkestan, on the banks of the Ili River, at the junction of Mongolia, Turkestan, and the Russian province of Semipalatinsk. Its area covers 147,900 square miles, and its population is said to amount to half a million. *Tibet* comprises the mountainous region lying between Turkestan and Nepal and Assam. On the east it adjoins China Proper, and on the west Cashmere. It covers an area of 651,500 square miles. Its capital is Lassa.

The authority exercised by the Chinese over their dependencies is by no means uniform. Some of the dependencies are closely connected with the empire, while others are merely tributary; and Tibet is so independent as to do little more than profess a nominal allegiance to the emperor of China, as the suzerain of the country.

CHINA PROPER (anciently *Cathay;* Chinese, *Chung Kwoh,* "Middle Kingdom") forms the southeastern portion of the empire, and occupies less than a third of its whole extent. Not including the island of Hainan, it lies between lat. 20° 20′ and 41° N., and lon. 98° and 123° E. China is bounded, north by one of the most remarkable of human structures, the Great Wall, which proceeds directly over mountain and valley, and for a length of 1,250 miles forms the barrier between China and Mongolia; on the west it is bounded by Tibet; on the south by Burma, Tonkin, and the China Sea; and on the east by the North Pacific Ocean. There are 18 provinces with area and population as follows:

Provinces	Area; English square miles	Population	Population per square mile
Chi-Li (Pe-chi-Li)	115,800	20,937,000	172
Shan-Tung	55,970	38,247,900	683
Shan-Si	81,830	12,200,456	149
Honan	67,940	35,316,800	520
Kiang-Su	38,600	13,980,235	362
Ngan-Hui	54,810	23,670,314	432
Kiang-Si	69,480	26,532,125	382
Che-Kiang	36,670	11,580,692	316
Fu-Kien (Fokien)	46,320	22,876,540	494
Hupeh	71,410	35,280,685	492
Hunan	83,380	22,169,673	266
Shen-Si	75,270	8,450,182	111
Kan-Su	125,450	10,385,376	82
Sze-Chuen	218,480	68,724,890	314
Kwang-Tung with Hainan	99,970	31,865,251	319
Kwang-Si	77,200	5,142,330	67
Kwei-Chau	67,160	7,650,282	114
Yünnan	146,680	12,324,574	84
Total	1,532,420	407,253,029	av. 266

Physical Features.— The coast-line, forming an irregular curve of about 2,500 miles, gives about one mile of coast for every 500 miles of area. It is not deeply penetrated by gulfs. the only one of great extent being that of Pe-chi-Li in the northeast, but numerous indentations form safe and capacious roadsteads. With exception of a bold and rocky peninsula in the province of Shan-Tung, the shore from the Gulf of Pe-chi-Li south to the island of Chusan is flat, and in many places so little raised above the sea-level as to be extensively inundated during a continuance of strong winds. From Chusan to the mouth of Canton River it is usually rocky; from this point southwest, flats chiefly prevail. A peninsula of some size juts out in the extreme south from Kwang-Tung province, separated from which by a narrow strait is the large island of Hainan. Chusan Island and archipelago are also of importance, but most of the innumerable islands dotted round the Chinese coast are very small. The large island of Formosa, off the east coast, now belongs to Japan. Many lighthouses have been planted along the coast. Owing to the exclusive policy of the Chinese and their dislike of foreigners, a great part of the interior of the country must be regarded as still almost a *terra incognita.* The surface is mostly mountainous. The general slope is from west to east, and the mountains are a continuation of those of Tibet and Central Asia. Branches of the Kuenlun traverse almost the whole breadth of China. In Western Sze-Chuen, there are peaks reaching the height of 25,000 feet. In the north the Nan-shan branch of the Kuenlun range runs under various names along the northeast of China till it reaches the frontier of Manchuria, north of Peking. A third great mountainous region of China is in the southeast, where extensive chains stretch on the south of the Yang-tse-Kiang all the way from the highlands of Yunnan to the eastern seaboard. Between the main mountain systems, and following courses which may be roughly described as parallel, run the two great rivers of China, the Hoang-Ho, and the Yang-tse-Kiang. Here lie the central and richest Chinese provinces. On both sides of the lower Hoang-Ho is an immense delta plain, consisting generally of a deep alluvial soil of unparalleled fertility. This great plain has a length of not less than 700 miles, and a width varying from 150 to 500 miles, and probably maintains a denser population than any other portion of the earth's surface of similar extent.

Rivers and Lakes.— No country of the world is better watered than China. The Yang-tse-Kiang, which traverses the country centrally from west to east, has a course of some 3,000 miles, and forms a splendid inland waterway up which ocean steamers can sail for 1,100 miles to Ichang, a port opened to foreign trade. The Hoang-Ho, farther north, and next in size, has a course of over 2,600 miles, but is of much less value for commerce, being comparatively shallow, subject to tremendous and disastrous floods, and apt to shift its course. The Grand Canal connects the lower course of the Yang-tse with that of the Hoang-Ho, starting from Hang-Chau Bay in the south, and being continued to Tien-Tsin in the north, thus completing what is said to be the most magnificent system of water communication in existence. This great waterway has, however, been greatly

CHINESE EMPIRE.
SCALE OF MILES
0 50 100 200 300 400 500 700
Population of places is indicated by different lettering, thus:
200,000 and over ..... PEKIN
100,000 200,000 ..... Wei
50,000 100,000 ..... Funing
1,000 50,000 ..... Talping
Smaller Places ..... Pi
Railroads
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RUSSIA
SIBERIA
MONGOLIA
CHINA
EASTERN TURKESTAN
TIBET
INDIA
BURMA
SIAM
TONGKING
GULF OF TONQUIN
BAY OF BENGAL
Dengiz Lake
Akmolinsk
Barnaul
Semipalatinsk
Karkaralinsk
Lake Balkash
Kara Kul
Irtish R.
Yenisei R.
Nu Udinsk
Kirilitsyak
Balagansk
Irkutsk
Baikal
Ulukem
Tannu
Dargat
Altai Mts.
Bulgun
Kobdo
Kirgis Nor
Khoton Nor
Ulyasutai
Urga
Tsheshtukhan
Kobdo
Kirgis Sul
Narvantchi
Zaisan Nor
Khoton Nor
Ider R.
Khoton Nor
Kemil
Khor Musu
Olon Nor
Borlo
Sakusu
Mergenzana
Khonili
Manitu
Tegurik
Tatsa
Unilu
Bulan
Yin-Shan
Kanchau
Ninghia
Liangchau
Siuling
Lanchau
Kungchang
Tsinchau
Fengtang
Hanchung
Hingan
Paoning
Suiling
Chengtu
Shuiking
Szechuan
Chungking
Kiating
Suchau
Kuiyang
Kuilsing
Yunnan
Mengtsz
Hanoi
Luang Phrabang
Vinh
Hatinh
Pakhoi
Lienchau
Kiungchau
Nanning
Pe
Nong Kai
Pitsanulok
Pegu
Rangoon
Maulmain
Prome
Mandalay
Bhamo
Lashio
Moulmein
Tavoy
Mergui
Bassein
Akyab
Chittagong
Dacca
Calcutta
Darjiling
Gangtok
Tashilhunpo
Shigatse
Lhasa
Gyangtse
Phari Dzong
Tsaidam
Kuku Nor
Koko Nor
Sining
Lanchau
Kansu
Shensi
Szechuan
Yunnan
Kwangsi
Kwangtung
Kweichau
Hupeh
Hunan
Kiangsi
Fukien
Chekiang
Kiangsu
Anhwei
Honan
Shantung
Shansi
Chihli
Manchuria
Mongolia
Gobi
Desert
Karaburan
Altyntagh Mts.
Kuenlun Mountains
Marco Polo Mts.
Tangla Mts.
Himalaya Mts.
Celestial Mts.
Thian Mts.
Karakorum Mts.
Hindu Kush
Sulaiman Mts.
Khingan Mts.
Yablonoi Mts.
Stanovoi Mts.
Yablonoi Mts.
Lucknow
Cawnpore
Allahabad
Hurdwar
Bareilly
Ganges R.
Brahmaputra R.
Irrawaddy R.
Salween R.
Mekong R.
Yangtse R.
Hoang Ho
Amoy
Swatow
Foochow
Ningpo
Shanghai
Hangchau
Nanking
Chinkiang
Hankow
Ichang
Changsha
Kiukiang
Wuchang
Siangtan
Hengchau
Kweilin
Wuchau
Canton
Macao
Hongkong
Swatow
Amoy
Foochow
Ningpo
Shanghai
Nanking
Chinkiang
Hankow
Ichang
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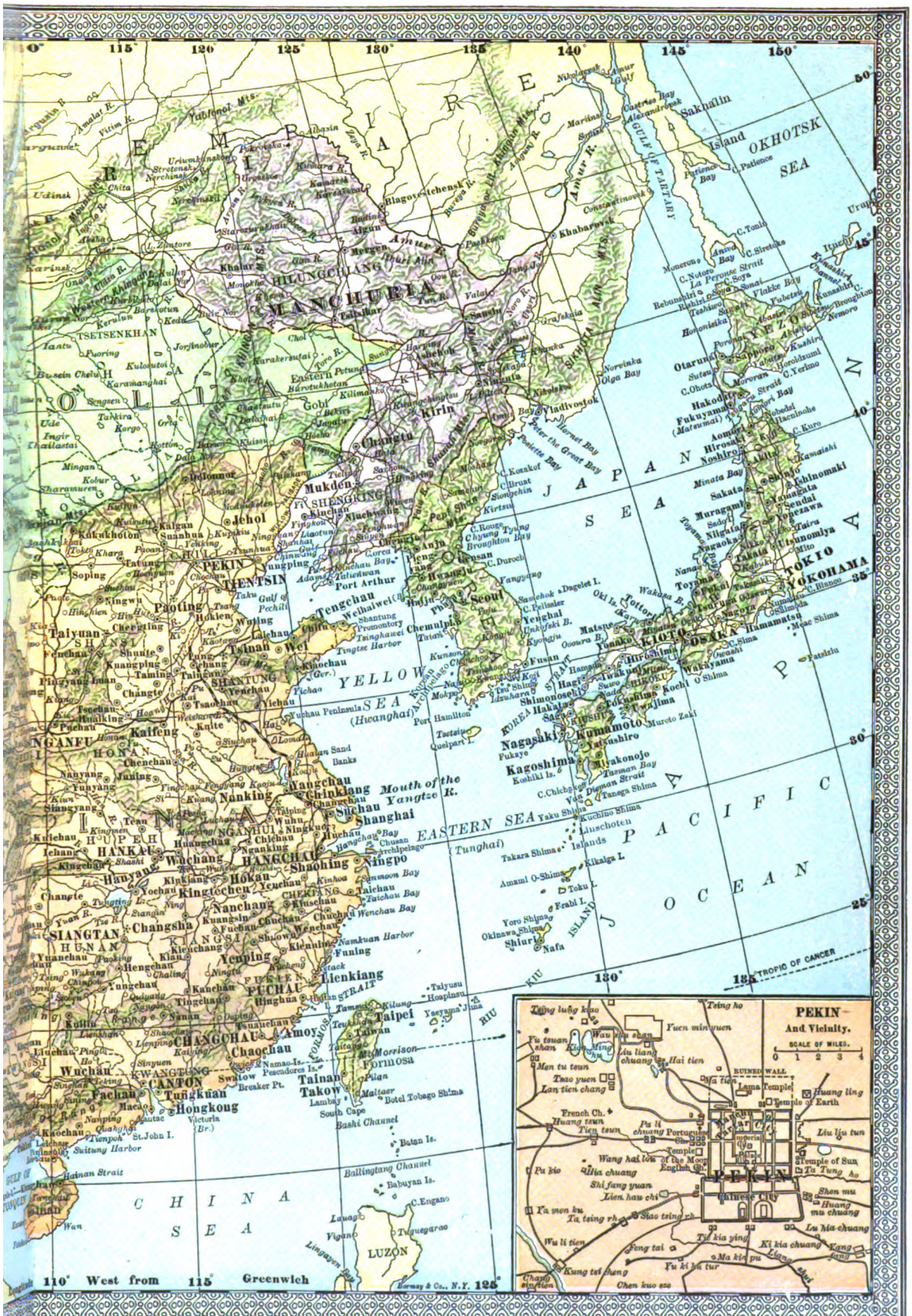
Kiukiang
Wuchang
Siangtan
Hengchau
Kweilin
Wuchau
Canton
Macao
Hongkong
Longitude


EASTERN SIBERIA
MANCHURIA
MONGOLIA
CHINA
JAPAN
SEA OF JAPAN
OKHOTSK SEA
PACIFIC OCEAN
YELLOW SEA
EASTERN SEA
CHINA SEA
Sakhalin Island
Amur R.
Khabarovsk
Vladivostok
Kirin
Changtu
Mukden
Jehol
PEKIN
TIENTSIN
Kalgan
Kweihwa
Paoting
Taiyuan
Tatung
Soping
Tsinan
Tsingtau
Tsaochau
Yenchau
Kaifeng
Nanking
Chinkiang
Shanghai
Soochau
Hangchau
Ningpo
Wuchang
Hankau
Hanyang
Kingtechen
Nanchang
Changsha
Siangtan
Yochau
Yuenchau
Yenping
Foochau
Lienkiang
Amoy
Chaochau
Swatow
Canton
Wuchau
Tungkuan
Hongkong
Macao
Kiungchau
Pakhoi
Haikang
Hainan Strait
Suitung Harbor
Taipei
Taiwan
Tamsui
Kilung
Hoapinsu
Yeyama Jima
Formosa
Tainan
Takow
Pescadores Is.
Botel Tobago Shima
Bashi Channel
Babuyan Is.
C.Engano
Luzon
Lingayen
Vigan
Taguegarao
Lamay
Ballingtang Channel
Formosa Strait
Miyakonojo
Kagoshima
Nagasaki
Kumamoto
Hakata
Shimonoseki
Fusan
Seoul
Chemulpo
Port Arthur
Dalny
Wei-hai-wei
Tsingtau
Kiaochau
Tsingtau
Yokohama
Tokio
Kioto
Osaka
Hiogo
Nagoya
Shizuoka
Yokkaichi
Hamamatsu
Yokosuka
Misaki
Kushimoto
Kochi
Iwakuni
Moji
Nagasaki
Kagoshima
Miyakonojo
Tanega Shima
Yaku Shima
Kuchino Shima
Amami O-Shima
Okinawa Shima
Shiuri
Nafa
Kikaiga I.
Toku I.
Frabi I.
Takara Shima
Tsushima
Iki Shima
Goto Is.
Fusan
Gensan
Vladivostok
Nikolaevsk
Amur Gulf
Gulf of Tartary
Castries Bay
Alexandrovsk
Patience Bay
C. Patience
C. Terpeniya
Aniva Bay
C. Elizabeth
Hakodate
Otaru
Sapporo
Aomori
Hirosaki
Noshiro
Akita
Sendai
Yokote
Aizu
Niigata
Toyama
Fukui
Kanazawa
Nagaoka
Takata
Utsunomiya
Mito
Mt. Fuji
Oshima
Hachijo
Mae Shima
Fatsisio
C. Blanco
C. Kuro
C. Erimo
C. Soya
Nemuro
Kunashiri
Etorofu
Shikotan
Broughton I.
Port Hamilton
Quelpart I.
Dagelet I.
Oki Is.
Liancourt Rocks
Tsushima
Iki Shima
Goto Is.
Matsue
Yonako
Hamada
Iwakuni
Moji
Nagasaki
Kumamoto
Yatsushiro

neglected, and threatens to become unnavigable, unless the necessary repairs are taken in hand. Besides these rivers and their numerous tributaries, the most deserving of notice are the Si-Kiang in the south, of considerable size but still more commercial importance, having at or near its mouth Canton, Hong Kong, and Macao; and the Pei-Ho, which, though much smaller, forms a waterway between Peking and the Gulf of Pe-chi-Li. The lakes of China, though rather numerous, are not individually of great extent. Perhaps the largest is Tung-Ting, in the province of Hunan, which furnishes an affluent to the Yang-tse-Kiang, and has a circuit of 270 miles. Po-yang, in the province of Kiang-Si, is 90 miles long by 20 broad, abounds in fish, and is remarkable both for the picturesque scenery around it and the numerous beautiful and populous islands which it encloses.

Climate.— The greater part of China belongs to the temperate zone, only a small portion of the south lying within the tropics. It has what is called an excessive climate, and has a far greater range of temperature than is usual within the same parallels of latitude. Peking, the capital, is nearly a degree south of Naples, and yet while the mean temperature of the latter is 63°, that of the former is only 54°. In summer, however, the heat reaches from 90° to 100° in the shade, while the winter is so cold that the rivers usually continue frozen from December to March. At Hong Kong, notwithstanding the influence of the sea in checking extremes, the thermometer in June and July, the hottest months, frequently stands at 90°, and in winter, from December to March, sinks nearly to the freezing-point. At Canton, snow, though rarely, has sometimes fallen. At Shanghai, lat. 31° 20′, the range of temperature is still greater, the maximum reaching 100°, and the minimum falling at least 20° below freezing, or 12° F. In the south the climate is of tropical character, the summer heat rising to 120°. Here the southwest and northeast monsoons blow with great regularity, and nearly divide the year. In the north they are more variable. The violent hurricanes known as «typhoons» are not uncommon in the Chinese seas.

Geology.— The geology of China is very imperfectly known, but there is no doubt that all the leading geological formations are found in it. Primary formations are most largely developed in the mountainous regions of the west, where granite, gneiss, and primitive schists prevail. The same formations exist to a more limited extent in the southeast, where bleak mountains of granite give that district a distinguishing feature. The secondary formation, including the carboniferous and cretaceous system, occupies a considerable area, and the coal fields of China are perhaps the most extensive in the world. The Tertiary formation has its largest development in the northeast, and probably underlies the greater part of the alluvium which covers the surface of the Great Plain. A surface feature of a great part of northern China is the earthy deposit known as «loess,» which covers an immense area both of mountain and valley, forming a yellowish-brown soil of the utmost fertility.

Mineralogy.— China is well supplied with useful minerals. Gold, though not thought to be very abundant, is obtained by washing the sand of several of the rivers, particularly those of the upper branch of the Yang-tse, and in the mountainous and almost inaccessible regions of Yunnan. Silver is also found in the same regions. The quantity suffices for a large annual export, chiefly in payment of opium and other goods. Copper, besides forming the ordinary currency in limited mercantile transactions, is worked to a great extent for economical purposes. Mercury or quicksilver, in the form of cinnabar, is of frequent occurrence, and is much used both for coloring and medicine. Its poisonous fumes are even said to be inhaled like opium or tobacco. There is no want of iron either in the form of rich hematite, or in that of the carbonate of the coal-measures, but smelting is not carried on to any considerable extent. Lead, tin, and zinc exist, but owing either to a deficiency in quantity, or ignorance of the method of extracting them economically from the ores, the native product falls short of the consumption. Some authorities reckon the coal-fields of China as equal in value to all the other coal-fields of the world together, and some time they must certainly become of immense economic importance to the country. The area of the coal deposits in the southeastern part of the province of Hunan is about 21,700 square miles. The coal occurs both bituminous and as anthracite, but as most of it is raised without machinery, by the rudest forms of manual labor, the price is necessarily high, and the quantity mined is trifling. Defective means of communication partly account for backward state of coal-mining. Coarse mixtures of culm and earth are used as fuel to some extent, while other still more inefficient and less attractive compounds are employed. Among other mineral substances may be mentioned nitre, alum, gypsum, and more important than all, inexhaustible beds of kaolin or porcelain earth, the early possession of which by the Chinese, and their great skill in working it, has given the name of China to the beautiful ware which so long monopolized the market of Europe. Jade appears to be found in China in its most perfect form, and is there held in the highest estimation, being wrought into trinkets and into ornamental articles of various kinds. Various precious stones also are found, and agates especially are admirably wrought.

Zoology.— China is said to possess about 200 indigenous mammals and over 760 birds, most of which are found in adjacent parts of Asia, and some are also European. Among the *mammalia* are several species of the monkey tribe, one of them being the so-called Cochin-China monkey, marked by a striking variety of stripes and colors. Another is the proboscis monkey. Tigers and leopards were at one time so numerous as to have been regularly hunted in state by the emperors, but these animals have been extirpated except in certain localities, especially in Yunnan and Manchuria. A small species of wild cat is sought for as game, and served at table as a delicacy. Bears are frequently mentioned, and their paws are said to be in high request among Chinese gourmands. Other *carnivora* include the lynx, badger, civet, marten, and weasel. The elephant, rhinoceros, and tapir occur in some localities of the southwest. Both camels and elephants are employed as domestic animals, the former only in the north. Bats are numerous, and one large species is extensively used as food. To the indige-

nous animals already mentioned may be added the wild hog, porcupine, raccoon-faced dog or Chinese fox, and several species of rats, more especially one of a yellow color, larger than those of Europe, and much prized for its skin. Several species of deer are met with, one being the musk deer. In birds, as above indicated, China is extremely rich. Pheasants in particular are famous, both for variety and for beauty. Among others are the well-known gold and silver pheasants, the former one of the most gorgeous of the feathered tribe. The peacock is also indigenous, and fowls akin to our common domestic variety. Birds of prey include eagles, falcons, owls, etc. Song birds, such as the nightingale and thrush, are well known and much appreciated. Water-birds of almost every kind abound, such as ducks, geese, swans, pelicans, etc. The mandarin-duck is a Chinese species famed for beauty of plumage. But perhaps the most remarkable water-bird is the fishing cormorant, the training of which forms an important employment, and is so complete, that when a bird has secured a fish which from its size he cannot manage singly, his neighbor darts down and assists him to complete the capture. The reptiles of China include several large serpents not regarded as dangerous, and one species at least which is very venomous. Tortoises are common, and are often kept in gardens and pleasure-grounds. No country is said to possess a greater number and variety of indigenous fishes than China. All its waters — its rivers, lakes, pools, canals, and even ditches — are full of fish. This is partly owing to the artificial means by which the natural supply is vastly increased. Boat-loads of water containing spawn are carried to distant parts and deposited in ponds, where the fry are fed with various species of lentils, or with yolks of eggs.

Botany.— The flora is naturally extensive and varied. In the south it is tropical in character, farther north, sub-tropical, and still farther there are many plants and trees identical or nearly so with those of middle Europe. Among trees commonly found in China the bamboo (if this gigantic grass should be called a tree), as in India, is perhaps the most valuable of all on account of the almost endless uses to which it is applied. Oaks of different species are common, and the economical uses of the various parts — the wood, bark, and galls — are perfectly understood. Even the acorns of some kinds are ground into flour, and converted into a farinaceous paste. Coniferous trees are represented by numerous forms of pine, yew, and cypress, some of them of great economic importance. The tallow and camphor trees abound, as also the mulberry and paper-mulberry. Palms are not abundant, but the cocoanut flourishes in Hainan and on the adjacent coast. The Pandanus or screw-pine is abundant in the south, but the date-palm is not known. The chestnut, walnut, willow, and hazel are all indigenous. The fruit-trees include the fig, mango, guava, lichi, loquat, orange, peach, pomegranate, quince, nectarine, plum, apricot, etc. Plants producing lacquer or varnish, and medicinal herbs of various kinds (including ginseng), are also well known. Among shrubby plants, the first place is unquestionably due to the tea-plant, of which further mention is made below. The next in importance is the mulberry, on the leaves of which the silkworm is nourished. Among flowering shrubs or trees are the rose, with its numerous varieties, the hydrangea, the passion-flower, the lagerstrœmia, Indian pride, the Chinese tamarisk, various species of cactus, and the camellia. The Chinese flora is particularly rich in varieties of the azalea. Altogether the abundance of flowering-plants, shrubs, and trees is a feature of the Chinese flora. Dwarfing is a favorite occupation, and the Chinese horticulturists force plants to assume the most fantastic forms.

Agriculture.— This first of arts has always been held in the highest veneration in China. The emperor himself, to do it honor, repairs annually to an appointed spot with a large retinue, and, taking the plow in his hand, draws a furrow and sows some seed. A similar festival is held in the capital of each province. The agriculture of the Chinese has been lauded in high terms by almost all who have had opportunities of witnessing it. In the important processes of stirring the soil, eradicating weeds, economizing manures, and applying them in the form best fitted to nourish the crop and bring it to maturity, they display unwearied industry and no small degree of skill. On account of the dense population, every square foot of land that can be made to raise food is kept in constant service and at the highest point of fertility. Even mountain slopes are terraced and tilled, sometimes to the height of 8,000 feet, wheat or other grains being the usual crop in these places. The farmers slavishly follow a routine which has been handed down without change from untold generations, and not only display no inventive powers themselves, but obstinately refuse to profit by the inventions of other countries. Their implements generally are of the rudest description, and though improved European and American plows have been sent out and urged on their acceptance, they reject them with disdain, preferring a rude shapeless thing drawn by oxen or buffaloes. They appear to have no idea of raising improved breeds of horses and cattle by the arts so well known and practised in other countries. The only animal of which the Chinese can be said to have furnished us with an improved breed is the pig. Their asses and mules are also of good quality. Rice, as the principal food of the people, is the staple crop. The rich alluvial plains which cover a great part of the surface are admirably adapted for its culture, and, by careful management, yield amazing crops — not one merely, but in the south latitudes two crops of rice in the hot season, besides a winter green crop usually plowed in for manure. In the neighborhood of Ningpo, lat. 30°, where the summer is too short to mature two crops in succession, they are still obtained by an ingenious device. The rice is sown in seed-beds, and afterward planted out in drills. A first planting is made about the middle of May, and in two or three weeks after, a second planting is made in the intervals between the previous drills. When the first crop is reaped in August the other is still green, but being stirred and manured, and having plenty of light and air, comes rapidly forward, and is reaped in November. The whole steps of the process are conducted with the greatest care; and the water-wheel, worked by the hand, or by an ox or

buffalo, is kept in daily operation from the first planting of the crop till it is nearly ripe. The reaping instrument is not unlike our sickle; and the crop, when not thrashed on the field, as is generally the case, is carried home and built up into stacks, resembling those of Europe. The rice is not always grown on alluvial flats, and there is a variety, known as dry-soil rice, that is cultivated like any ordinary cereal. The sides of the hills are often laid out in a succession of gently sloping terraces, and planted with rice in drills running across the declivity, thus admitting of being irrigated by streams which, retarded at every step, move slowly forward without acquiring any impetus. The same mode of culture is also practised with other crops. In the north the crops principally consist of our ordinary cereals and legumes — wheat, barley, pease, and beans. Vegetables of various kinds are generally grown for household use. Varieties of the cabbage tribe are extensively cultivated for the sake of the oil extracted from the seeds. The raising of green crops to be plowed in as manure is generally common where rice is cultivated. Two kinds of plants are chiefly employed; one of them, a trefoil, grown on ridges similar to those which form the intervals in our celery beds. Among other crops regularly and extensively grown may be mentioned sugarcane, used chiefly in a green state; indigo; the castor-oil plant; and numerous plants grown for their roots. The opium poppy is now so extensively cultivated that there is a much smaller demand for the imported article than formerly. Maize, buckwheat, and tobacco may also be mentioned as cultivated crops. Three other plants of the greatest economical importance, and so extensively grown as to form important branches of Chinese agriculture, deserve a separate notice. The first is the mulberry. Judging from the quantity of raw silk annually exported, and the general use of silk for dress, especially by the wealthier classes of the country, it is evident that a large area must be appropriated to the cultivation of this tree, and millions of persons employed in the different processes connected with it. The plants are not allowed to exceed from four to six feet high, and are planted in rows, often along the banks of canals. The mulberry farms are small, and are generally worked by the farmer and his family. The Chinese silk is much heavier than the Italian, and preferred in fabrics requiring lustre and firmness. Whether it owes its quality to a particular variety of mulberry, or to the climate or soil, has not yet been definitely ascertained. The second plant more particularly deserving of notice is the cotton-plant. That cultivated in China is of the same species as the ordinary American, namely, *Gossypium herbaceum*. The plant producing the yellow cotton used in the manufacture of nankeen appears to be of a more stunted habit than the ordinary cotton. It is chiefly cultivated in a level tract around Shanghai, forming part of the Great Plain, and is the staple summer crop. The culture differs little from that of other cotton countries, more especially the cotton districts of India. The third plant, the tea-plant, is cultivated in two varieties — *Thea bohea* and *Thea viridis;* and though it was long supposed that the former only yielded black and the latter green tea, it is now known that both kinds of tea are obtained from each. The great tea provinces are Kwang-Tung, Fu-Kien and Che-Kiang. In the first the *Thea bohea* is grown, and the tea is of inferior quality; in the other two the *Thea viridis*, which yields all the finer qualities, and furnishes the greater part of all that is exported to Europe. In these two provinces, where the culture is most extensive and carried to its highest perfection, the tea plantations are usually formed in a deep rich loam, never on the low lands, but on the low hilly slopes. The tea farms, as common throughout China in all kinds of culture, are small, and their management, including not merely all the steps of the culture of the plant, but the preparation of the leaves for market, is almost invariably confined to the farmer and his family. The leaves are gathered thrice — about the middle of April, when the leaf-buds are beginning to unfold; about a fortnight after, in the beginning of May, when the leaves are fully grown; and when the leaves again are newly formed. The first gathering yields the finest and most delicate tea, but with considerable injury to the plants.

Manufactures.— In all the arts necessary to the comfort of life, and in not a few of those conducive to luxury, the Chinese have made considerable progress. One peculiar feature in their processes is the general absence of machinery. Except in a few industries the great moving power is manual labor. The silk stuffs of China have long borne a high name, and in several qualities are still unsurpassed. The loom in common use is worked by two persons, one of whom sits on the top of the frame, where he pulls the treadles and assists in making the various changes which must be made on the machine while in operation. By means of it the workman can imitate almost any pattern. The crapes and flowered satins, and damasks for official dresses, manufactured by the Chinese are particularly excellent. Everybody wears silks. It is the prescribed attire of high officers; soldiers are not considered in full uniform without it. The finer kinds of it form the ordinary dresses of the opulent, while the poorest manage to deck themselves in a coarser quality, at least on gala days. The embroidery of silk is carried on to an amazing extent, the perfection to which it has been brought creating an almost unlimited demand, both domestic and foreign, and employing myriads of the inhabitants. Steam-power has latterly been utilized in the reeling and spinning of silk. In cotton goods the Chinese make good and substantial fabrics, but the cheapness and good appearance of the foreign goods have given rise to a large importation. Nankeen, once so common in Europe, is still produced as before, and continues to form an important branch of domestic manufacture. Cotton mills and factories of the European type have recently been established. Linen seems not to be made in China. Flax is not grown, but a good substitute for it is found in the fibres of two or three plants, especially ramee, from which the beautiful grass-cloth, similar in appearance to linen, is extensively woven. Woolen fabrics are made only to a very limited extent. The consumption of leather in China is not great, and the manufacture of it is very imperfect. The porcelain of China has been famous from the earliest periods. The manufacture of the finest forms of it being long known to the

Chinese alone, gave them the monopoly of the world, and though in elegance of shape and design they must now yield the palm to Europe, for quality of material and rich gorgeous coloring they still hold perhaps the foremost place. Paper is an article that has been made in China from an early period and with great success. The manufacture of glass is not carried on to a great extent, and this is one of the few arts which, at least in regard to its finer processes, the Chinese have condescended to learn from Europeans. In beautiful lacquered ware the Chinese continue unsurpassed. Much of its excellence appears to be owing to the fine varnishes which they have learned to extract from native plants. Except in some few articles the Chinese are backward in the manufacture of metal goods; but recently, and under European leading, machinery, small arms and ordnance, warships, etc., are being produced in the country; as well as soap, matches, and other articles. Many small articles made by hand display much finish and delicacy of workmanship. See CHINESE ART.

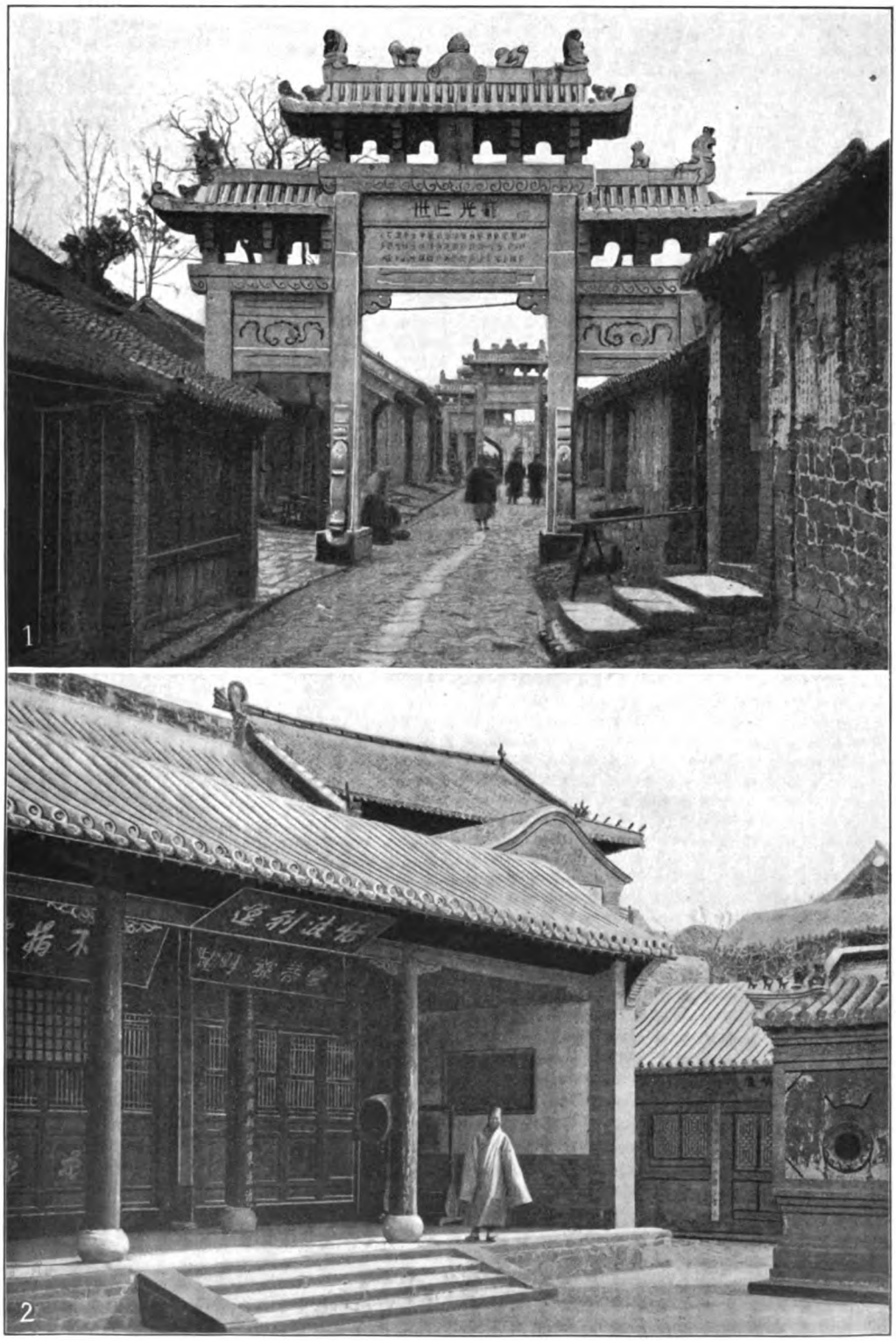
Trade and Commerce.— The inland trade of China, aided by the unusual facilities which it derives from a system of water communication, ramifying like net-work over all its provinces, is of incalculable magnitude. Its rivers and canals are so covered with junks and barges and swarms of smaller boats, that there does not seem much exaggeration in the estimate which makes the tonnage belonging to the Chinese little short of the combined tonnage of all other nations. The inland commerce, however, is much hampered by the rarity of good roads.

By the opening of the principal ports the foreign commerce has been immensely increased. Till 1842 the trade with foreigners, exclusive of that carried on by the mainland through the town of Kiachta, with the Russians, was jealously restricted to the mouth of Canton River. By the Treaty of Nankin, in the above year, Hong Kong was ceded to Great Britain, and Canton and four other ports were thrown open, namely Amoy, Fu-Chau, Ningpo, and Shanghai. At subsequent dates other ports have been added to the list of treaty-ports for foreign commerce, and about 30 ports are now open, the most northern being Niu-Chwang, in Manchuria, and the farthest inland being Chung-King, on the upper Yang-tse, some 1,500 miles from the river's mouth. Steamers do not go higher at present than Ichang (1,100 miles), the trade above this being carried on by junks or other craft. Several other of the ports are on the Yang-tse. Of all the Chinese ports, Shanghai, at the mouth of the estuary of the Yang-tse, carries on much the largest trade. In 1902 China agreed to open five new treaty ports, Chang-Sha, Ngan-King, Wan-Hsien, Wai-Chau, and Kong-Mun. In 1900 the number of foreigners in all treaty ports was 16,811.

Among the countries which maintain commercial relations with the Chinese the principal are: Great Britain and her dependencies, Hong Kong and India; Japan, the United States, and Russia. The latest trustworthy statistics relating to the foreign commerce of China are set forth in a report for the year 1901 by Mr. J. W. Jamieson, British commercial attaché at Peking. He shows that from 1896, when it amounted to little more than $270,000,000, it had increased by the close of 1901 to about $315,000,000, a gain of nearly $45,000,000. To this total the imports contributed a little less than $200,000,000. During that period, however, the imports from the United Kingdom fell off more than $6,390,000, and the exports thither by nearly $1,800,000. The trade with Hong Kong and India, on the other hand, increased, but the returns in relation to Hong Kong are deceptive, because large quantities of Chinese produce are sent thither from Canton and other ports in southern China for transshipment to other localities in the Middle Kingdom. Imports from the United States during the period named have increased by $7,380,000, and the exports from China to the United States by upward of $3,000,000. The imports from Japan have increased more than $10,000,000 in five years. Imports from the United States in 1903 were valued at $18,303,369; exports to the United States from China, $20,583,068. The Japanese merchants are especially welcome in China. Those Japanese who have most to do with China, study not only the language, but also the ideas derived from Chinese literature. That knowledge of the Chinese educational system and of the ideas inherited through it has a value even in the sphere of commerce, the Russians have already recognized; the same insight and sagacity mark the course of Germany.

The Chinese, in carrying on their extensive dealings, domestic and foreign, have in all 24 weights and measures, but of these only 6 are in common use, namely, the liang or tael = 1⅓ ounces avoirdupois; kin or catty = 1⅓ pounds avoirdupois; and picul = 133⅓ pounds, used in weighing bulky articles; and decimals of a tael, called mace or tsien, candareen or fan, and cash or le, used in reckoning bullion, gems, drugs, etc., 19 cash making 1 candareen, 10 candareens 1 mace. The only native coin now current is the cash, a small piece of thin circular copper about three quarters of an inch diameter, with a square hole in the middle for convenience of stringing. Native silver bullion, called *sycee*, and gold bullion of similar shape, and usually stamped with the names of the banker and workmen, and the year and district in which it is cast, are used in larger transactions. All taxes are paid in *sycee* of 98 per cent fineness. Private bankers are found in all large towns, and some of them pay interest on deposits. They issue paper money, which passes current in the particular districts where they are known. The Mexican dollar has been made a current coin all over the empire. In Shanghai, Tien-Tsin, Han-Kow, and the northern ports, the tael is commonly used.

Railroads.— Railway communication is as yet very limited in extent. The lines actually in working order in 1903 were as follows: Shanghai to Wu-Sung (built in 1898); Kai-Ping to Pe-Tang; from Tien-Tsin to within a short distance of the Great Wall, by way of Chan-Hai-Ouan, and with connection to Peking (built by Li Hung-Chang's advice; length 298 miles). Of lines conceded and projected since 1897, the list is as follows: (*a*) The Russian line through Manchuria, with branch to Port Arthur and Niu-Chwang (begun in 1897, to be completed in 1904: length of main line 1,200 miles, branch line 600 miles). (*b*) The German Kiao-Chau line (total length, 621 miles). (*c*) The Franco-Belgian line from Peking to Han-Kow



1. A Street in Tungchow.

2. Reception Hall of Temple.

Mau

(the first line to be constructed by imperial decree). In the north, this line has been completed, and is in working order, as far as Pao-Ting-Fu, about 50 miles from Peking; in the direction of the Yang-tse the work has been completed as far as Sin-Yang, 120 miles from Han-Kow. The line will connect with Tai-Yuan-Fu and Singan-Fu. (*d*) The Anglo-German line from Tien-Tsin to Chin-Kiang with connections to Tsi-Nan; total is about 620 miles. (*e*) The English line from Tai-Yuan to Fu-Chau (298 miles); and two lines from Shanghai, one in the direction of Su-Chau, Chin-Kiang, and Nankin, the other to Hang-Chau and Ningpo. (*f*) The Belgium line from Canton to Han-Kow, with a junction at Hong Kong. (*g*) The French lines from Lavi-Kai to Yunnan-Fu from Lang-Son to Long-Chau and from Nan-ning-Fu to Peking.

People.— The Chinese belong to that variety of the human race which has been called Mongolian, but in them its harsher features, as represented in the genuine Tartars, are considerably softened. They are generally of low stature, have small hands and feet (the last often artificially made so small in the females as to become a deformity), an olive or yellowish complexion, much modified by the degree of its exposure to the open air, prominent cheek-bones, depressed nose, eyes obliquely turned upward at the outer extremities, black hair, scanty beard. In bodily strength they are far inferior to Europeans, but superior to most Asiatics, their great assiduity and patient endurance of fatigue making them highly prized as laborers throughout the Indian Archipelago. Perhaps the finest physical specimens of the race are to be seen among the coolies or porters of Canton. The Chinese are deficient in courage, yet often display great contempt for death. In their moral qualities there is much that is amiable. They are strongly attached to their homes, hold age in respect, toil hard for the support of their families, and in the interior, where the worst kind of foreign intercourse has not debased them, exhibit an unsophisticated and pleasing simplicity of manners. In the great mass these qualities are counterbalanced, or rather supplanted, by numerous vices — treachery, lying, gambling, opium-smoking, etc.

Population.— The Imperial treasury department of China has recently published an official census of China in connection with a readjustment of the imposts that are destined to pay its war indemnities. It appears from this census, that the empire contains 426,000,000 inhabitants, and that China Proper — with its 18 provinces — contains 407,000,000. In the provinces, the number of inhabitants per square mile is greatest in Ho-Nan and least in Kan-Su. In the dependencies the density of population is far less than in China Proper, especially in Mongolia and Turkestan, which are very sparsely populated. The density is 22 times greater in Ho-Nan than in Manchuria. The population of the United States as a whole is about 20 persons per square mile. The population of China Proper is about 300 per square mile. If the whole population of the United States and 40,000,000 more were crowded into the State of Texas the density of population would be about equal to that of the Yangtse Valley and of the plain extending north and south between the lower courses of the Yangtse and the Hoang rivers. Ngan-Hui but a little larger than New York State has more than three times the population. Che-Kiang province, slightly less in area than Kentucky, has more than 10 times the number of inhabitants, and between Kwan-Tung and Kansas the ratio is 21 to one.

No census figures based upon official returns are obtainable for the dependencies, and the nature of the population in these regions makes even a close estimate difficult. The data for 1903 may be given approximately as follows:

China	407,330,000
Manchuria	8,500,000
Mongolia	2,580,000
Tibet	6,430,000
Sungaria	600,000
East Turkestan	600,000
	426,040,000

Language and Literature.— The Chinese language belongs to those Asiatic languages commonly called monosyllabic, because each word is uttered by a single movement of the organs of speech, and expresses in itself a complete idea or thing. All Chinese words in the Peking tongue end either in a vowel, a diphthong (in which, however, each vowel sound is distinctly pronounced, making the word often to appear of more than one syllable), or a nasal. Of such simple words or roots there are about 450. But the accent of many of these words may be varied by the speaker in four or five different ways, so as to produce a corresponding variety in their meaning, by which means the number of simple words or roots amounts to about 1,200. The relations of words are ascertained by their position in a sentence. Hence Chinese grammar is solely syntax. Since many words similar in sound are different in signification, while in writing each idea has its peculiar symbol, the number of words represented by writing, without reckoning those peculiar to certain dialects, is perhaps 10 times greater than those distinguished by the ear. The number, in fact, is reckoned at 50,000. In writing and printing the characters are arranged in perpendicular columns, which follow one another from right to left. In its origin Chinese writing is hieroglyphic or picture-writing, with the addition of a limited number of symbolical and conventional signs; and anyone well acquainted with these symbols has obtained a good introduction to the reading or writing of Chinese. The larger number of Chinese characters are formed by the combination of such hieroglyphs and signs. But as one such character by itself seldom determines the sound, an additional word is conjoined for the purpose; so that the great mass of Chinese written words consists of an ideographic and a phonetic element. Native grammarians divide their characters into six classes.

The confusing variations in the forms used to represent Chinese proper names in English is an almost inevitable result of the characteristics of the former language. Uniformity seems at present almost impossible of attainment, but the practice of compounding geographical names in such a way as to bring into prominence the significance of certain often-used monosyllables has considerable to recommend it. For instance, "Fu" (or "Foo") added to the name of a place, as Ningpo-Fu, indicates a city ruled by an official directly responsible to the head of a pro-

vincial government; that is, a city of the first class. In the form Ningpofu, the force of the compound is weakened. "Chau" (or "Chow") indicates a city of the second class; that is, a city subject to the ruler of a greater city; and "Hien" is used for a city of the third class; that is, a city of a dependent province. "Shan," meaning "mountain," is found in the name of the province Shan-Si ("Mountainous West"), Shan-Tung ("Mountain Province"), etc. "Kiang," meaning "stream," is found in the names of rivers, as Yang-tse-Kiang, Min-Kiang, Si-Kiang, etc. (the form Yang-tse-Kiang River being patently incorrect), and in the names of the provinces Kiang-Su, Kiang-Si, etc. In the case of names that have been longest known to the English-speaking world, or most frequently in use, such as Peking, Nankin, Shanghai, Ningpo, etc., although uniformity demands the compound form, the present form has been fixed by constant usage. Among other Chinese terms in general use in referring to places and institutions are the following:

Fu-tai, or Foo-tai, the governor of a province.

Godown, the place for storing goods.

Haikwan, the customs duties.

Hwang, emperor, yellow.

Li, a Chinese mile (equal to one quarter English mile).

Likin, an inland tax on foreign goods in transit.

Nui-Ko, privy council.

Shih, imperial.

Tael, a coin equal to one and a third ounces silver in weight.

Tao-tai, governor of a city.

Ting, a city of a small province.

Tsin, a prince.

Tsin-wang, a prince of the blood.

Tsung, clan, family (sometimes board).

Tsung-li-Yamen, a cabinet council of advisory powers having charge of official relations with foreigners.

Tsung-tuh, viceroy or ruler of more than one province.

Yamen, office (for official business).

The Chinese literature, from a geographical, ethnographical, and historical point of view, is unquestionably the most comprehensive and important of the whole of Asia. The printed catalogue of the Emperor Kien-Lung's library is composed of 122 volumes. In the five canonical or classical books, called 'King' are contained the oldest monuments of Chinese poetry, history, philosophy, and jurisprudence, some portions of which belong, perhaps, to the most ancient writings of the human race. Confucius, in the 6th century B.C., collected them from various sources, and in this collection they have been pretty faithfully handed down. In lyrical poetry the most distinguished names are Li-tai-pe and Tu-Fu, both of whom flourished at the beginning of the 8th century A.D. The romantic poetry of the Chinese, though void of poetic beauty, is valuable for the insight it gives into their domestic life.

The art of making paper is said to have been known in the 1st century, and printing from wooden blocks, in the 7th or 8th century, hundreds of years before these valuable arts were invented in Europe. In China literary eminence is the sure avenue to the highest honors and offices of the state, appointments being obtained by competitive examination; hence "the *literati* are the gentry, the magistrates, the governors, the negotiators, the ministers of China." Naturally among the more comfortable classes, education of the kind which promises to be best rewarded is almost universal. For the lower classes also every village throughout the empire has its school, but the subjects taught are of the most elementary description; attendance is far from general, and is limited to the male sex. In 1898 an "Imperial University of China" was established at Pekin. The first allowance for the building was $112,000, and an allowance of $150,000 is annually made for its support. The sciences, arts, and philosophy are included in the curriculum. Dr. William A. P. Martin, an American missionary and educator, was appointed first president of this institution, and three of its professors were from the United States. Students occasionally go abroad for study at foreign universities or technical schools. A few newspapers and periodicals are published in Chinese, especially at Hong Kong.

Religion.— Judging by the multitude of temples and joss-houses seen in every quarter, and the endless number of ritual acts performed on high festivals and in the ordinary intercourse of life, the Chinese are a most religious people. The religion of the state is Confucianism, an ethical system founded by Kong-Fu-Tse or Confucius, about 550 B.C. Another religion is Taoism, introduced about the same time by Lao-tsze, and numbering a good many adherents. (See CONFUCIUS, LAO-TSZE.) Among the great mass of the people a form of Buddhism prevails, or a curious mixture of religious ideas and forms. In the conduct of daily life they are under the dominion of innumerable superstitions, living in dread of demons whom they constantly endeavor to ward off or appease. Their belief in feng-shui, or the influence of "aspects," works against the introduction of railroads and other modern improvements. Attempts to introduce Christianity were made by the Nestorians as early as the 6th century, but the celebrity of the Jesuit missions has thrown all others into shade. The Roman Catholics now claim to have about 1,000,000 adherents among the Chinese. Various Protestant bodies carry on missionary operations in China. There are now probably over 50,000 native Protestants. During the Boxer massacres many native Christians were martyred.

Customs, Manners, Dress, etc.— Among the Chinese, politeness is carried to an extreme. They scrupulously avoid all contradiction in conversation, and are careful not to use any offensive or irritating expressions. From the same source arises the tedious, frivolous, and often absurd etiquette and extravagant compliment for which they are remarkable. But even here a wish to please and gratify is sufficiently evident. An invitation to dinner is written on a slip of red paper, and is sent some days before; it is usually in this style: "On the ——— day a trifling entertainment will await the light of your countenance; Tsau Sanwei's compliments." This is followed by another card naming the hour. The dinner itself is sumptuous, wine and spirits are drunk freely, and the whole affair goes off with a great deal of boisterous merriment. Fresh pork, fish, and fowls form the staple articles of food, with vegetables of various kinds. Beef and mutton are rare.

Opium and tobacco are in common use. The usual beverage among all classes is tea, of which the Chinese consume enormous quantities.

In ordinary cases, strict separation prevails between the male and female branches of a household. Betrothment is entirely in the hands of the parents, and is conducted through the medium of a class of persons called *mei-jin*, or go-betweens, whose office of matchmaking is considered honorable. The marriage itself is conducted with much ceremony, gay processions, and other convivialities. Besides one wife, strictly so called, a man who can afford it may have several subordinate wives. A wife may be divorced on several grounds that we should deem frivolous. Infanticide is common among the very poor, the female children being almost the only victims.

The return of the new year is an occasion of unbounded festivity and hilarity in China, and New Year's Day is a universal holiday for rich and poor. At this season all accounts are expected to be adjusted, and if this is delayed or neglected the creditor has sometimes recourse to the expedient of carrying off his debtor's door. On New Year's morning all shops are shut, and this usually continues for several days. There are also various festivals throughout the year, but no weekly day of rest. Gambling is universal in China. Porters play by the wayside while waiting for employment; and hardly has the retinue of a great official seen the latter enter the house when they pull out their cards or dice and squat down to a game. Dress, like other things, undergoes its changes in China, and fashions alter there as well as elsewhere; but they are not as rapid or as striking as among European nations. Regarding dress, there are certain restrictive laws in operation. The mandarins or officials have some special peculiarities of dress, and their respective ranks are indicated by the nature of the knob or button they have on the top of their hats. The wearing of the queue or pig-tail is perhaps the most noticeable external peculiarity of the Chinese as regards costume. The headdress of married females is becoming, and even elegant. The copious black hair is bound upon the head in an oval-formed knot. No caps, bonnets, hoods, or veils are worn abroad; a light bamboo hat, or an umbrella, protects from the sun. The extraordinary practice, peculiar to China, of compressing the feet of females (especially those of the better class) into unnatural form and dimensions has been already alluded to.

Dwelling-houses are generally of one story. The common building materials are bricks, sifted earth, matting, or thatch for the walls, stone for the foundation, brick tiling for the roof, and wood for the inner work. The fronts present no opening but the door. The walls are often stuccoed, but not painted, and the bricks are occasionally rubbed smooth with stones, and the interstices pointed with fine cement. The general internal arrangement of a Chinese dwelling of the better sort is that of a series of rooms of different dimensions, separated and lighted by intervening courts, and accessible along a covered corridor, communicating with each, or by side passages leading through the courts. Streets are generally so narrow as to be mere lanes. The most characteristic Chinese structures are the pagodas, built generally with a number of stories, each marked off from the rest by a peculiar projecting portion.

Government, Laws, Army, and Navy, etc.— The government is an absolute despotism. The emperor unites in his person the attributes of supreme magistrate and sovereign pontiff, and theoretically as "Heaven's Son" is to heaven alone accountable. In practice, however, the rigor of this despotism is considerably softened, and the greatest blot upon the Chinese administration is the corruption which in every form that ingenuity can devise is rampant throughout the empire. The emperor's principal ministers, four in number, two of whom are Manchus and two Chinese, form an interior council chamber, and beneath them are a number of assessors who form the principal council of state. The government business is distributed among seven boards, having cognizance respectively of the conduct of civil officers, of revenue, of rites and ceremonies, of military affairs, of naval affairs, of crime, and of public works. Another board, the Tsung-li-Yamen, has the charge of foreign affairs. There is, besides, an office of censors, 40 or 50 in number, who go out into the empire as imperial inspectors, and are privileged to make any remonstrance to the emperor without endangering their lives. The provinces, either singly or by twos, are under a governor and sub-governor, and each province has also a chief criminal judge and a treasurer. Particular magistrates preside over particular districts and cities, and instead of being permanent are changed about once in three years. The great object aimed at is to maintain a strict surveillance and mutual responsibility among all classes; in other words, to imbue them with fear of the government, and infuse a universal distrust. The chief protection of the people is in a body of laws, called Ta-Tsing-Liuh-Li, that is, "statutes and rescripts of the great pure dynasty" which are held in high regard, and agreeably to which, with occasional violations, all public functions are discharged. The new code of laws that is being drawn up for the Chinese empire is to be the work of a Japanese professor of law. The Chinese army has been subjected to a certain amount of reorganization in recent years, and an attempt has been made to introduce improvements from the European countries. In each important town there is a Manchu force, and the total Manchu army is estimated at 270,000 men, with an organization of its own. There is a Chinese army separately organized from this, forming a kind of militia, supposed to include some 800,000 men. A considerable number of the men are now armed with rifles of European pattern, and the European drill has been partially introduced. Li-Hung-Chang, when governor of Pe-chi-Li, organized a corps of instruction drilled and trained on the European model, and this comprises 10,000 men. Numbers of Krupp guns are mounted on the fortifications; and there are arsenals superintended by Europeans. The navy contains several cruisers and other war vessels of the modern type, but the Chinese lost their most powerful ships in the war with the Japanese, and their navy is now of comparatively little strength. Three protected cruisers were built in 1897 in Germany for the Chinese fleet, and several sea-going torpedo boats, ordered before the war, have been also added. The reve-

nue of the empire is derived from customs, excise, and the land and salt taxes. Calculating on the basis of statistics for 1901, if the customs duties, including the sum payable in lieu of the *likin* or in land-transit dues, be computed at about 10 per cent, the revenue, if payable in gold, would be about $20,000,000.

China had a national debt before the war of 1894-5, and at the close of that contest she assumed a new indebtedness of $187,500,000. The aggregate indemnity which the foreign powers were to receive by way of indemnity for the Boxer outrages in 1900 was $337,500,000, payable in 39 annual installments. The whole of the Chinese customs revenue, if payable in gold, would be equivalent to about 6 per cent of the indemnity.

History.— The early history of the Chinese is shrouded in fable, but it is certain that civilization had advanced much among them when it was only beginning to dawn on the nations of Europe. The names of numerous dynasties belonging to a period two or three thousand years before Christ are still preserved, but how much, if any, of this early history is authentic, cannot be determined. The Chow dynasty, which was founded by Wu Wang, and lasted from about 1100 B.C. to 255 B.C., is perhaps the earliest that can be regarded as historic, and even of it not much more is historic than the name. Wu Wang is said to have divided the kingdom into 22 feudal states, and the continual internal rivalries which resulted from this policy encouraged Tartar raids and invasions. Under Ling-Wang, one of the sovereigns of this dynasty, Confucius is said to have been born in 551 B.C. During the latter half of the period in which this line of sovereigns held control, there appear to have been a number of rival kings in China, who lived in strife with one another. Chow-siang Wang, who was the founder of the Tsin dynasty, attempted to bring all China under his rule, but he was unsuccessful. His great-grandson, however, a national hero of the Chinese, who was the first to assume the title of "Hoang" (emperor), and henceforth called himself Tsin-She-Hoang-Ti, succeeded in accomplishing this. He ascended the throne at the age of 13 and fixed his capital at what is now Segan-Fu. Besides building a great palace there, he constructed numerous roads, canals, and buildings, throughout the country. He completely defeated several Tartar and other neighboring tribes, and suppressed a revolt in his own country. The Great Wall of China was begun by his command, and it was he who ordered all books treating of the past history of China to be destroyed. The present name of China is derived from the name of this dynasty. The Tsin dynasty ended with Hoang-Ti's grandson, who gave way in 206 B.C. to Lew Pang or Kaou-Te, the founder of the Han dynasty. Toward the end of the 2d century, or soon after the beginning of the 3d century, of the Christian era, the empire was divided into three states, which were again united under one ruler before the end of the 3d century. During the 10th century the right to the throne was disputed, and civil war raged till an adjustment took place by the establishment of the Tsung dynasty under Tae-Tsu 960 A.D. Under this dynasty great progress was made in literature and art. Inroads of Tartar hordes now pressed the Chinese so hard that they called in the aid of the Mongols or western Tartars, who freed them from their oppressors, but gave them a new master in the celebrated Kublai Khan who founded the Mongol dynasty, and removed the capital from Nankin to Peking. His ninth descendant was driven from the throne and a native dynasty called Ming again succeeded in 1368 in the person of Hungwu. A long period of peace ensued, but was broken about 1618, when the Manchus gained the ascendency, and after a war of 27 years established the existing Tartar dynasty in the person of Tung-Tchi. According to the Chinese, their dynasties, 26 in number, embrace a period of about 5,000 years, during which between 200 and 300 sovereigns have held the throne. The earliest authentic accounts of China, published in Europe, are those of Marco Polo, who visited the country in the 13th century. The first British intercourse was attempted under Queen Elizabeth in 1596, but the vessel sent did not reach its destination. A trade was subsequently established at Canton by the East India Company, but no direct intercourse between the governments took place till the embassy of Lord Macartney in 1793, which was well received by the Emperor Keen Lung. A second embassy in 1816 by Lord Amherst, was treated with insolence, and returned with a letter from the emperor to the prince regent, bearing among other things, "I have sent thine ambassadors back to their own country without punishing them for the high crime they have committed." The arrogance thus manifested could not fail, sooner or later, to bring on a collision; and accordingly, in 1841, the British, on being refused redress for injuries, partly real and partly alleged, proceeded to hostilities, and after scattering almost without a struggle every force which was opposed to them, were preparing to lay siege to Nankin, when the Chinese found it necessary to sue for peace. A treaty was then concluded, by which the five ports of Canton, Amoy, Fu-Chau, Ningpo, and Shanghai were opened to British merchants, the island of Hong Kong ceded to the British in perpetuity, and the payment of $21,000,000 agreed to be made by the Chinese. In 1850 an insurrection headed by Hung-seu-Tseuan or Tien-Te, who gave himself out as a descendant of the Ming dynasty, broke out in the provinces adjoining Canton, with the object of expelling the Chinese Tartar dynasty from the throne, as well as of restoring the ancient national religion of Shan-Ti, and of making Tien-Te the founder of a new dynasty, which he called that of Tae-Ping, or Universal Peace. After the capture and execution of Tien-Te his place was taken by Hong-Sin, who identified Shan-Ti with the God of Christianity, and regarded himself as called of God to make the old true religion of China again predominant. For a long period the insurgents succeeded in maintaining their ground against the imperial forces, and it was not till after the lapse of several years that the latter were enabled in some degree to quell the rebellion. Notwithstanding the cruel retaliation by the victorious party, and the wholesale massacres perpetrated on the insurgents, they were unable to stifle the spirit of revolt. In October 1856, the crew of a vessel belonging to Hong Kong were seized by the Chinese on the allegation that they had been concerned in a piratical attack on a Chinese vessel. The men, on the

remonstrance of the British authorities, were afterward brought back, but all reparation or apology was refused. The attitude taken up by the Chinese in this matter led to a declaration of war, and in 1857 the Chinese fleet was almost totally destroyed, and Canton was taken by the French and English troops. A treaty was at length concluded with Lord Elgin on behalf of the British, by which important privileges were secured; but an attack on the French and English ambassadors who were on their way to Peking to have the treaty ratified by the emperor led to the renewal of the war. The allied forces marched toward Peking, and after twice defeating the Chinese troops entered the city. This brought the Chinese to their senses, and the treaty was ratified. Meantime the Tai-Ping rebellion had been gaining strength, and the trade of Shanghai and Canton was materially interfered with. The British thereupon decided to assist the Chinese in quelling the insurrection, and the services of a young engineer officer, Capt. Charles Gordon ("Chinese Gordon," afterward so well known in connection with the Sudan), were lent to the government for that purpose. The rebels were gradually driven from their posts, and in July 1864, Nankin, their last stronghold, was taken. But the empire was still disturbed by rebellion in other parts. The Mohammedans in Chinese Turkestan, wishing to take advantage of the weakness to which the Chinese government had been reduced by the Tai-Ping rebellion, revolted almost simultaneously, but apparently independently, with those in the province of Yunnan in the southwest. In both cases the rebellion resulted in the temporary separation of the provinces from the empire. In 1883 hostilities broke out between China and France in consequence of the warlike operations of the latter in Tonkin and her claim to the protectorate of the country; but the matter was arranged early in 1885. In 1894 war broke out with Japan in connection with Chinese misgovernment in Korea, and in this struggle Japan had almost an uninterrupted success both by land and sea, driving the Chinese out of Korea, and invading China at several points. Peace was concluded in 1895, China agreeing to give up Formosa and pay a large indemnity to Japan, to open additional ports to foreign commerce, and to recognize the independence of Korea. In the autumn of 1897 two German missionaries were murdered in the province of Shan-Tung, and the admiral commanding the German squadron on the China station immediately effected a landing in the bay of Kiao-Chau, which, after much discussion, was finally leased to Germany early in January 1898. This acquisition of Chinese territory bv Germany attracted much attention among other powers whose interests were likely to be affected, and was followed at brief intervals by the leasing of the town and harbor of Port Arthur in the Liao-Tung Peninsula to Russia, and the leasing of the bay of Wei-hai-Wei to Great Britain. On 22 September, a *coup d'état* was effected by the dowager-empress of China, who had acted as guardian to the Emperor Kwang-Su during his minority, by which the emperor was again placed under her dominion. The prompt remonstrances of the representatives of the powers at Pekin served to prevent any extreme procedure on the part of the empress and her advisers, and the emperor afterward nominally regained power, but early in 1900 was reported to have abdicated.

In September 1899, Secretary Hay instructed the United States representatives in England, France, Germany, Russia, Italy, and Japan to invite from those governments a presentment of their intentions in regard to the treatment of the commerce of foreign powers in the newly acquired spheres of influence, with special reference to the treaties existing between China and the United States, advising that China be regarded as heretofore as an open market for the world's commerce, and that all possible steps be taken to establish much-needed administrative reforms and to preserve and strengthen the imperial government in its integrity. On 20 March 1900, Secretary Hay announced that all the powers concerned had accepted the proposals of the United States, and that he would consider their consent final and irrevocable. In May 1900, a secret society, colloquially known as the "Boxers," rose in the provinces of Shan-Tung and Pe-chi-Li and massacred native Christians and European missionaries. The Boxers were encouraged by the empress-dowager and the palace-party at Pekin, who placed themselves at the head of a movement directed against foreigners. The ministers at the European legations in Peking — Sir Claude Macdonald being at the head of the British legation — determined to requisition guards for their protection, and these arrived on 31 May. On 4 June the Boxers destroyed the Peking-Tien-Tsin Railway, and by cutting communications isolated the Europeans in Peking. Soon after the chancellor of the Japanese legation and Baron von Ketteler, the German minister, were murdered in the streets. In hope of relieving the legations, Admiral Seymour put himself at the head of 2,000 European troops and blue-jackets, and set out from Tien-Tsin for Peking, but had to retire. Meanwhile the Chinese had been manning the Taku forts at the mouth of the Pei-Ho, and making preparations for closing the entrance to the river. The commanders of the allied fleets — British, French, Russian, and German — in the Gulf of Pe-chi-Li gave notice to the Chinese to desist. The Celestials in reply opened fire on the European vessels, 17 June, whereupon the allies bombarded and destroyed the forts. The allied forces entered the foreign city of Tien-Tsin on 23 June, and the native portion of the city was taken on 14 July. All this time the legations at Peking were closely besieged and constantly bombarded. The smaller legations having been destroyed or rendered untenable, their occupants, together with a number of native Christians, took refuge in the British legation, which, from its extent and strength, offered a better prospect of protection. The legation was ill supplied with provisions, and the defenders were reduced to extremities, when the relief force of 12,000 men comprising British, French, German, Russian, and Japanese troops, forced its way from Tien-Tsin, 15 August. Before the arrival of this force the empress-dowager and her court, with the Emperor Kwang-Su, had fled from the capital, and it was impossible, with the troops and transport available, to overtake them.

Troops of various nationalities had been despatched from Europe to North China with all possible haste, and Count von Waldersee, the

German commander, had been accepted by all the allies as commander-in-chief, but international jealousies soon made themselves apparent, and complications seemed likely to ensue. In October 1900 it was announced that Lord Salisbury had concluded an agreement with Germany by which the two powers bound themselves to the principle of the "open door" in China, to abstain from seeking to obtain for themselves any territorial advantage, and to take such steps as might be agreed on for the protection of their interests, as against any other power seeking territorial aggrandizement. Subsequent military operations consisted chiefly of punitive expeditions to the south and west. Negotiations for peace were at once entered upon. On 4 December the powers sent a joint note to the Chinese peace commissioners, demanding among other acts, the execution of the leaders in the massacre of foreigners and the payment of an indemnity, which in October 1901, was fixed at $735,000,000. On the ratification of the indemnity agreement, the foreign troops were withdrawn from Peking. Later, through the good offices of the United States, the indemnity was reduced, being fixed at $337,500,000.

Events of 1902–3.— On 7 Jan. 1902, the imperial court returned to Pekin, making a brilliant entry. The Europeans witnessed the pageant from the Chien-Men gate, the privilege being in contrast to the old rule under which no foreigner could see the passage of royalty through the streets. The empress after her return showed marked courtesies to the ladies of the foreign legations, introducing the innovation of receiving them in person. Four important edicts were issued on 10 January, placing political science and western arts among the subjects of study at the Hanlin Academy; creating Chang Po-Hsi minister of education, with instructions to draw up a new scheme of education; appointing Wang-Wen-Shao director of the board of railways and mines, and nominating Yuan-Shih-Kai director-general of the Pekin-Shan-hai-Kwan Railway. Among other edicts was one urging the abandonment of foot-binding. On 12 February there was made public an Anglo-Japanese agreement. Its aim was the maintenance of the independence of China and Korea, and the prevention of territorial dismemberment. In a note sent to the other powers, by France and Russia, the two allied governments reserved "the right to consider, eventually, means of ensuring the defense of their own interests." The Manchurian convention between China and Russia was signed 8 April. Manchuria was therein acknowledged as an integral part of China, the right of sovereignty and of administration was restored (as before Russian occupation), and the period of the evacuation was reduced to 18 months, the withdrawal to be in six months after signature of the convention, and to be completed in successive removals from three specified portions of Manchuria. Russia also consented to restore conditionally the Shan-hai-Kwan, Niu-Chwang & Sin-min-Ting Railway. A rebellion in the south of China caused much disturbance, in the aim of founding a Chinese dynasty, in lieu of the present Manchu rule. The conflict between political and railway interests among the various powers concerned with concessions continued during the summer. On 15 August, Tien-Tsin was formally restored to China. The protocol tariff agreed to by the powers was signed 29 August. and a scheme for abolishing "likin" (q.v.) throughout the empire was embodied in a commercial treaty with Great Britain, signed 5 September. On 8 October the Russians restored, but in form rather than in reality, the first portion of Manchuria named in the Manchurian Convention. In December it transpired that the German government had imposed upon China, as a condition of the former's consent to evacuate Shanghai, the promise not to grant any preferential rights opposed to the principle of the "open door," and also a stipulation that the forces of all the powers should evacuate the port simultaneously. The government of the United States had in November invited the powers to submit to The Hague tribunal the settlement of the question whether the war indemnity should be paid on a gold or on a silver basis, our State department alone, of all China's foreign creditors, showing disposition to relieve China from the additional burden imposed by any fall in the market value of silver, and the arrival of the period for the payment of the first installment of the indemnity, 1 Jan. 1903, made the question a serious one for the Chinese government. The final payments will be made in 1941. The delay of Russia in carrying out the convention provision regarding the evacuation of Manchuria became in the spring of 1903 a cause of international uneasiness, and the policy outlined by the czar's government regarding relations with China gave rise to so much inquiry and protest that an attempt was made by Russia to explain away her demands. The still occupied portions of Mukden and Kirin were, by the convention, to be evacuated in April, and the final and complete withdrawal from the province was to occur in July; but in spite of Admiral Alexieff's proclamation announcing that there had been a removal of troops on 23 April, an incessant activity after that date in railway development and transportation of supplies and ammunition, the building of barracks, and other signs of permanent occupation, tended to keep up the general distrust of Russia's intentions. The rebellious state of certain portions of the Chinese provinces during 1903, gave cause of serious anxiety to the viceroys, and their fear of anti-dynastic movements even led to the discountenancing of public meetings in Shanghai, called to urge government resistance to Russia's demands. The increased intercourse which has been manifested during the past few years between China and the western powers has tended to bring the vast population into closer touch with western ideas, and the question of to-day is no longer whether the Chinese will tolerate the presence of the foreigner, but which particular nation shall obtain the greatest privileges within the Celestial empire. The rivalry of the different powers concerned in the opening up of China is very keen, and the issue is yet undetermined. Great Britain desires to see the empire freely opened to all traders irrespective of nationality, while Russia and France aim at the acquisition of portions of Chinese territory for their own exclusive advantage. It is this conflict between a partition of China into spheres of influence and the maintenance of the empire in its full integrity,

while opening it up to foreign trade that occupies the attention of diplomats.

Chinese in America.— It is estimated that there are about 100,000 Chinese in the United States, and that 30,000 of them are in San Francisco. There is a considerable Chinese colony in New York, and there are small colonies in Philadelphia, Boston, and Chicago. Though they do not belong to the educated classes, 95 per cent. of them can read and write. A daily paper in the Chinese language is published in San Francisco and another in New York.

Nearly all the Chinese in the United States come from the single province of Kwang Tung, the most populous of the eighteen provinces of the Chinese Empire. Its capital is Canton. Six counties of this province send out most of the emigrants to the United States. In 1900 an educated Chinese from the province of Shan Tung said that beside himself there were only two Chinese in the United States that came from any province in China other than Kwang Tung. The inhabitants of this province have for centuries been more adventurous and fonder of traveling than the rest of their fellow-countrymen, and they are always ready to face danger if there is a good chance of profit.

Bibliography.— Beresford, 'Breakup of China'; Boulger, 'History of China'; Doolittle, 'Social Life of the Chinese'; Douglas, 'Society in China'; Holcombe, 'The Real Chinaman'; Hosie, 'Three Years in Western China'; Abbé Huc, 'Christianity in China, Tartary, and Tibet,' 'Travels in Tartary, Tibet, and China' and 'The Chinese Empire'; Johnston, 'China and Formosa'; Krausse, 'China in Decay'; Legge, 'Religions in China'; Martin, 'The Chinese, Their Education, Philosophy, and Letters,' 'A Cycle of Cathay,' 'Chinese Legends'; and 'The Siege in Pekin'; Moule, 'New China and Old'; Mounier, 'Le Drame Chinois'; Navarra, 'China und die Chinesen'; Nichols, 'Through Hidden Shensi'; Smith, 'Chinese Characteristics,' 'Village Life in China,' China in Convulsion'; Meadows Taylor, 'Chinese and Their Rebellions'; S. W. Williams, 'The Middle Kingdom' and 'History of China'; Williamson, 'Journeys in North China'; Wilson, 'Travels and Investigations in the Middle Kingdom'; Wu-Ting-Fang, 'Foreigners in China'; Yule, 'Book of Ser Marco Polo.'

China and Japan. When in 1823 in response to the Russian ukase claiming exclusive possession of the Pacific coast of North America to the 51st parallel, John Adams told the Czar's minister, Baron de Tuyl, that "we should contest the right of Russia to any territorial establishment on this continent, and that we should assume distinctly the principle that the American continents are no longer subjects for any new European colonial establishments," he not only gave the first clear expression in action to the Monroe Doctrine (q.v.), but he unconsciously perhaps dictated the future history of the Pacific Ocean and in large measure the peaceful progress of China and Japan through American influences. Thus ushered into the world's politics, the United States, after resisting the Czar's demand and by diplomacy alone forcing it back to parallel No. 55, prevented the Russian advance southward in America, and later gained California, Alaska and the Aleutians with a vast front on the Pacific, then whitened by our whaling and trading ships. Once California and Oregon ours, the incentive was quickly given to tap the markets of Asia and awaken the hermit nations to commerce. After Monroe, Fillmore. The latter, on the day that Mutsuhito, the present emperor of Japan, was born, 3 Nov. 1852, ordered Commodore M. C. Perry (q.v.) to proceed, by the shortest route — around the Cape of Good Hope — to Yedo Bay to negotiate a treaty. Perry's triumph was a "brain victory," won by tact, patience, and consummate knowledge of human nature and especially the Japanese variety of it. He opened a new era in the treatment of Oriental nations, showing how, apart from force, the door of international brotherhood might be opened. On the spot at Kurihama, where, in 1853, stood the pavilion for the reception of the President's letter, rises to-day in Perry Park the memorial monolith inscribed in gold by Marquis Ito (q.v.), to the erection of which the Mikado, leading his people, subscribed. At Yokohama, where the conferences of Commodore Perry and Professor Hayashi were held to discuss ethics, humanity, and treaty business, and the first industrial exhibition in Japan of American tools, inventions, and products was held, the United States consulate and the Union Church have been upreared. Thus led forward, the hermit Japan entered the school of experience whence she was to emerge as the pupil of the Anglo-Saxon nations and the champion of their principles in Asia, and the teacher of China and the middle term between the civilizations of the Orient and the Occident. After her own political commotions, consequent upon the clash of old and new ideas, Japan from 1870 engaged the service of hundreds, yes even thousands, of Yatoi (hired specialists) from America and Europe, to rebuild the foundations of the empire, and for 30 years besides sending thousands of her sons abroad, put herself under the tuition of an army of teachers from western countries who were active in every department. Yet what has been in phenomena true of Japan has been in the working of leaven true of China also, only her larger mass hindering the visibility of real progress. Perry's succes with Japan really opened a new era in the whole Chinese world of eastern Asia. The spirit of America's commerce, education, diplomacy, missions, and the political policy of the United States have been the greatest factors not only in the awakening of China, but in influencing and regulating the policies of the aggressive European nations in their dealings with China and the neighbor nations of the Far East. Japan, contrary to popular notions, is a very young nation, being, according to the unanimous verdict of critical scholarship and all the evidence in hand, no older than the Germanic nations, coming to national self-consciousness in the 5th century of the Christian era. Naturally then she has taken quickly to western culture in the 19th, as in the 5th and 15th century. The Chinese, being an old race, with all the limitations of senility are more slow in their mental movements than the Japanese, who show all the peculiarities of a young race. Yet in both empires progress, through the combination of old and new forces, has been real.

Surveying the past fifty years and especially

what has been done within the 20th century, it is well to show still further wherein the Chinese and Japanese are alike or different from each other, and also wherever they have human traits in common and systems in harmony with or in contrast to the nations of the West. We may appraise changes actually wrought and see how far these movements or evolutions are to be attributed to agencies within or without these countries. There are those who consider Japan almost wholly a self-reformed nation, while others think that all transforming agencies have come from without. The truth lies in the golden mean between these extremes of opinion. China's vastness of area and density of population prevent even keen western observers and students and certainly the average Occidental, from any clear perception of leavening principles and transmuting elements within so large and venerable body politic. They may note what is phenomenal, while they are usually blind to the psychic changes in the Far East. Hence, for example, the real energies of the native secret societies and sects within the Chinese empire cannot be definitely gauged, yet that they have been for centuries a real force, frequently showing themselves in both bloodless and bloody manifestations, the last being the so-called Boxer insurrection of 1900, can be demonstrated. That these sects yet exist in great potency is certain. Until Western diplomatists discern that China, equally with Turkey or Russia, and what survives of old Japan, is a church nation, with a fixed creed upheld by the government and maintained by force, and that China always has been, and is still, a persecuting nation, there can be no sound diplomacy. Failure to see this adds mystery to the Chinese problem and accounts largely for the discreditable surprise at the Boxer outbreak in 1900, foreseen by the missionaries, but to the approach of which so many diplomatists in Peking were blind. This politico-ecclesiasticism based on the Confucian writings and philosophy, is the foundation of a social system that has survived the fall of over 30 imperial dynasties, and is still at once the most potent check upon and the choicest weapon of government, whether by pure Chinese or alien rulers like the present Manchus. Hence to attack that dogmatic system is treason in a native, a horrible offense in a foreign missionary, and only tolerable in the Mahometans because they are so numerous and powerful. The maintenance of this dogma by the sword of the normal magistrate, himself *ex officio* an orthodox Confucian, has been the cause of persecutions during the ages with bloodshed abundant. This is the real reason of so many reactions, and of repeated disappointments. China has again and again raised hopes among Occidental people that she was about to modernize her laws and people, only to dash the expectation of optimists to the ground. Even in this 20th century she has, after founding schools and universities, apparently on modern ideas, even appointing American and European officers and teachers, cast these persons aside, and neutralized their methods, ostensibly because natives or Japanese were preferred, but in reality to maintain her dogma of Confucian orthodoxy, because the decrees from Peking demand adherence to Confucianism. Whatever modifications China has made in her system are as yet simply external, nor will there be any real progress in the western sense of the word until Chinese bigotry and persecution are abandoned and the union of church and state given up. The plea of China is that innovators under the pretext of progress are seditious and that reforms by natives mean republicanism and thus destruction of the dynasty. But this is only another phase of that Chinese indirection of mind, which Dr. Arthur Smith in his book on 'Chinese Characteristics' has so exposed with such masterly skill. The certainty of the Chinese union of church and state, the instances of bigotry and bloody persecution, and the great slaughter of Chinese in the name of orthodoxy during past ages, making the Chinese government a shedder of blood for opinion's sake, quite equal to Russia or the mediæval states of Christendom, are shown by that life-long scholar of Chinese, J. J. M. DeGroot of Leyden, in his monograph, 'Sectarianism and Religious Persecution in China.' In weight of scholarship based on original research this work outweighs all that has thus far been written on the subject of China's politico-religious status. In the future these sects will doubtless play a very important part, and probably with more effect on China's internal structure, than either the Tai Ping rebels or the «Boxers» (q.v.). Such possibilities must exist as long as China represses thought and opinion for conscience' sake by her absolutism in religious matters. Nor is it likely that she will find any better solvent for her problems than the complete separation of church and state and the granting, not only of academic freedom, but of perfect liberty of conscience to her people. So long as she refuses to grant such liberty, both in the school and to the masses, there will be no end to internal disorders and to foreign complications. In this matter of self-reformation, as the past has already proved, the elements tending to reconstruction and the evolution of the Chinese into the modern man are most likely to arise from among the natives who have been educated or helped by the teachers from foreign countries. The overwhelming majority of such men of modern mind are Christian, though others are far from lacking. Almost all the knowledge of China by the Western world comes from aliens, who have studied, surveyed, and described the country, and who in addition to propagating their dogmas have given the Chinese pretty nearly all the exact science they possess. One cannot ignore the services of those physicians, engineers, advisers, financiers, customs officers, who, with or without Chinese pay, have for a century or more served China's people. It was an American, Ward, who showed the possibilities of the Chinaman as a soldier. What other Americans have done in China is set forth in the book 'America in the East.' It was an American, S. R. Brown, «A Maker of the New Orient,» for example, who established the first (Protestant) Christian school in China, brought the first Chinese students to America, and demonstrated the ability of the Chinese youth to absorb Western learning and methods. Among his pupils was Yung Wing, who, after graduating with honors from Yale College, brought to the United States under government patronage, six score Chinese lads as students, one of whom was Sir Liang Chang, the present Chinese envoy at Washing-

ton. In a word the efforts of the lay and clerical teachers, helpers, and healers of the Chinese, especially since the opening of the ports, and within the last 60 years, reveal a force that has, in the peaceful American, rather than the conquering Russian way, helped to give credibility to the prophecy of one of the greatest of China's foreign teachers, S. Wells Williams: "The regeneration of China will be accomplished like the operation of leaven in meal, without shivering the vessel."

The Japanese are not compacted wholly of Oriental stuff. They differ from the Chinese physically and psychically. Though they form a race having in it many elements, Tartar, Korean, Malay, Nigrito, etc., their basic aboriginal stock, the Aino, is very probably a branch of the Aryan family of humanity, and the Japanese are thus allied in some measure with the "white" races. In mind and temperament they differ from the Chinese, not only as insular people dwelling on volcanic soil constantly shaken by earthquakes, may be supposed to differ from continentals inhabiting stable lands in river valleys, but also in culture and aims. The Chinese are ethical, the Japanese esthetical. In China filial piety is the cornerstone of civilization, in Japan it is loyalty. The archipelago produced the samurai — soldier and scholar in one. The mainland generated the literati who despise the soldier. In Japan the centre and abiding element of all is the dynasty, one and unbroken during written history, for fifteen hundred years. In China the binding force is the social system, independent of figureheads in the capital, abiding through many changes of rulers but ever crowned by a religious system that tolerates no other and looking on all other cults as alien and dangerous. Even in old Japan we discern a church nation. Religion and politics though not nominally united were practically one, and bloody persecutions were far from unknown. Even yet the germs of fanaticism and persecution are not wholly eradicated though perhaps nearly so, nor can they be so long as academic freedom is curtailed or religion is in any way made an official engine of government. In the early ages of unwritten history the conquest of the primeval tribes of similar ethnic stock and of the Ainos in Japan was by the force of the dogmas of Shintoism (the primitive religion or Divine Way) as well as by superior arms and valor. The Mikado was the regent and deputy of the gods of heaven and earth, and church and state were one. When Buddhism with its superior refining and elevating forces came to civilize the Japanese barbarians, this Aryan cult overshadowed Shinto, but was none the less the great breeder of action and reaction in the life of the nation. When its missionary activities ceased and the nation was Buddhaized, Buddhism became itself the superior influence in politics, reducing the Mikado to a shadow, thus paralyzing the central authority, making the throne a mystery instead of a power. Buddhist monks organized as armies and not only overawed the emperor, but among warring feudal lords decided questions at issue even on the battlefield. Smitten down by Nobunaga (1533–82) and its power for a time curtailed, Buddhism was again patronized by Iyeyasu (1542–1616) in 1600 and made the popular religion, and its priests sent as sleuth hounds to hunt down Christian believers. Roman Christianity was thus suppressed by the sword and ever vigilant inquisition. While the people were ruled by the bell of the bonze, the gentry and scholars who studied Confucianism and made it into a code of ethics, a philosophy and a creed, were given to understand that no departure from the official orthodoxy approved in Yedo would be tolerated. As matter of fact scores of executions of good men under the Yedo bureaucracy were brought about because of philosophical heterodoxy whenever and wherever associated with alleged sedition. It was in the name of the government, also, that imprisonment and death were denounced upon all who should believe in the "evil sect," or Christianity. When in 1868 the Mikado's government assumed supreme control of the empire (one of the powerful elements of the revolution being the revival of the ancient Shinto dogmas and ritual), the old death-dealing anti-Christian edicts were once more republished and enforced. Thousands of suspected Christians near Nagasaki were imprisoned and distributed all over the country. Under strong diplomatic pressure these prisoners were released. When the Japanese embassy in America and Europe saw themselves abhorred as uncivilized because of their persecuting tendencies, the edict boards were taken down. The natives were left free to organize churches and publicly propagate their Christian tenets and steady progress was made until in the constitution of 1889, full freedom of conscience was granted in the famous Article No. XXVIII.: "Japanese subjects shall, within limits not prejudicial to peace and order, and not antagonistic to their duties as subjects, enjoy freedom of religious belief." In his commentary on this article, the Marquis Ito, called the "Father of the Constitution," writes, "Freedom of conscience concerns the inner part of man and lies beyond the sphere of interference by the laws of the state."

Nevertheless, since there is no real liberty when conscience is bound or scholarship fettered, it is not yet true in Japan that perfect freedom of belief, writing and publication is openly allowed to any one in government pay. When in recent years a learned professor, examining the ancient literature showed that the use of Shinto (which was never formulated into a system or given its name until after the introduction of Buddhism) as an engine of government was not justified, and that the claims of the Mikado to a divine origin rested on very slender foundation, because lacking documentary proof, and that the whole system of ancestor worship was not a part of original Shinto, but was borrowed from China, he was punished by being put out of his position and retired on half pay. Yet, though academic and religious freedom is not absolute in Japan, it is relatively so full and generous, that it must serve as an increasingly powerful example to China, nor will China be rid of her manifold complicated difficulties with both natives and foreigners until such religious freedom, as is guaranteed to the Japanese in the fundamental law of the empire, be made the privilege of the Chinese also.

In so far as freedom in the deepest things affecting man is won and guaranteed, does other freedom follow. China's conceit of her theo-

retical perfection of government and of her own long supremacy among pupil nations prevented her from that recognition of the rights and privileges not only of other nations but of her own people. When a Chinese subject left the frontiers of his own country, he was ignored by his government and what happened to him abroad bred no concern at Peking. The Chinese rulers, to whom China's golden age was in the past, had no suspicion of any civilization superior to their own or knowledge of progress in other lands. To her court for ages had come only vassals or pupils, but in our day economic pressure from the outside, the Western men's desire for trade, the wars and aggressions of foreign countries compelled her to recognize merit and even superiority elsewhere, and gradually China began sending commissioners and embassies to other countries, the first modern instance being the appointment as Chinese envoy to the United States and European powers of the American, Anson Burlingame, who had won the confidence of the government at Peking. Much that was expected of this embassy failed to come to pass because the Western nations were probably as sturdy in their conceit as the Orientals and expected all changes in Asia to come by imitation of Western ideas and methods, whereas genuine international progress comes only by mutual influence. In 1868 the first real treaty made by China, in which the principles of the world's international law received recognition by the Chinese government was negotiated, when reciprocal privileges were granted to the two contracting powers, China and the United States. Mr. Burlingame negotiated other important treaties with Denmark, Sweden, Holland, and Prussia, but died in 1870, while arranging the terms of a treaty with Russia. We say "the world's" international law, for, so far from the name or the thing having originated in Europe, there was for centuries an international law in the Chinese world or orbit of influence in eastern Asia, governing the relations between the great central empire which occupied a position among subject and neighbor lands which the old Roman empire did in the western part of the Eurasian continent. The experience of this Far Eastern international law included such situations and episodes as the frequent despatch and reception of envoys of various grades and for many purposes, concerning which there was a fixed etiquette and a code of rules, the growth of centuries. Among the questions treated in these international communications are those of a "protected state," intervention, defensive and offensive alliances, treaties of peace, naturalization, the treatment of prisoners of war, rules in regard to pillage, even of places taken by assault, the protection or destruction of private or public property, the protection of exempted persons, especially women and priests, the guarding of the edifices of religion, art, and science, the respect due to messengers and bearers of flags of truce and concerning the instruments of war and means of destruction. One may thus easily see that Japan's hearty adoption of the modern laws of nations is no mere borrowing or imitation of things unknown, but that the diplomatic discipline of centuries enables her easily to keep equal step with the most highly civilized nations in those courtesies and proprieties of which Christianity is the informing spirit. To these humane customs and usages Chinese, Japanese, and Korean history bears witness in hundreds of instances, but modern international law as formulated in the West received its initial recognition in China in 1868 under Burlingame. The epochal year of 1868 was the same in which Japan signed the treaties made with the Yedo shogun in the Mikado's name. Perry and Harris had treated with one who was only the Mikado's lieutenant at Yedo, but taught in the new school of international law by the American envoys the men who made the new government at Kioto formally adopted the principles of the laws of nations, and in frank acceptance of these principles began to relay the foundations of the empire, besides adopting representative government and civilized customs generally. When therefore the first great occasion arose between the two Asiatic states and always jealous nations, Japan and China, a still further development took place. Especially in the classic instances of the Peruvian ship Maria Luz in 1872, and the invasion of Formosa by the Japanese in 1873, was this seen. The Japanese government, having made inquiry into a cargo consigned to Callao, which was a human freight of Chinese laborers from Macao and held against their will, released the coolies and shipped them to China, a favor which was gratefully acknowledged by the Peking government. The so-called pagan nation of Japan achieved a great moral victory in breaking up a certain kind of slave trade which by euphemism was called the coolie traffic, while the very act shamed China into taking better care of her people. The results were soon manifest. For the first time China sent out commissioners to look after her own subjects in foreign lands, and her envoy going to Cuba and Peru refused to enter into treaty obligations with any South American state as long as a single Chinaman remained in the country against his will. Despite all protests of foreign consuls and ministers the Japanese persevered. Having freed their own *eta* or *pariahs*, they liberated the Chinese slaves in their own waters. This was the beginning of the establishment of Chinese consulates and legations throughout the world. To-day we find the Chinese increasingly social. The once hermit is in the world's market-place. The Middle Kingdom is represented in the Universal Expositions. Whereas it has been the rigid rule that a prince of the imperial blood must never spend a night outside Peking, we find, in 1904, the heir apparent to the throne, Prince Pu Lun, traveling in America. In 1874 after the wreck of a Riu Kiu junk on the coast of Formosa and the killing of the crew by the head-hunters, Soyeshima, the Mikado's minister, went to Peking and received audience with the Chinese emperor, standing upright though dressed in Western costume. He obtained from the Tsung-li Yamen the disavowal of responsibility over Eastern Formosa to which China laid no claim, and from the maps of which country it was omitted. Nevertheless after the interview, and when 1,300 Japanese soldiers had occupied Formosa for six months and chastised the savages, the mandarins of the capital, incited by foreign influence in Peking, awoke in wrath and shame, declared the Japanese intruders and menaced the island empire with

hostilities. Okubo (q.v.), sent by the Mikado to Peking, refused to treat in the matter except on the basis of international law. By this, war was averted and henceforth the world's legal standard was appealed to in all matters relating to Riu Kiu, Korea, and other questions in dispute, but with a tendency on the part of China to relapse into old tradition and custom, not being able to forget that she was no longer the "Middle" Kingdom. For example, the Chinese emperor Shunchi (1644–61) had written, "But now all lands both Middle (that is, China itself) and foreign, have become united into one vast empire, so that the whole earth has become one family and all the people of foreign countries are my children." When, therefore, Japan in 1870 occupied the Riu Kiu Islands and abolished their dual sovereignty, China protested, though not until 1874, and then in language of an exceedingly undiplomatic nature. After a long and somewhat acrid diplomatic correspondence, the controversy reached a dead-lock, when in the summer of 1879 Gen. U. S. Grant visited Peking. Prince Kung placing the matter before the American ex-President, bespoke the latter's assistance. This eminent American refused to pronounce any opinion on the merits of the case, but on his arrival in Japan, proposed unofficially to the Mikado's ministers a solution, and advised the Chinese government to withdraw their offensive despatches and appoint special commissions with full power to settle the matter. This proposal was accepted. An imperial commission was created by the Mikado's proclamation, and Mr. Shishido was appointed plenipotentiary commissioner to treat with Prince Kung and the ministers of the Tsung-li Yamen, the conference beginning its sittings on 15 Aug. 1880. The draft of the treaty was finished on 2 October, but the caprices of Chinese statesmanship were then beyond the range of ordinary prescience, and the action of the Peking government showed that they did not yet understand fully the meaning of the term "plenipotentiary commissioners." After 26 days' delay, 16 of them being after the date fixed for the signatures to the treaty, the matter was taken out of the hands of the high commissioners and transferred to the northern and southern superintendents of trade. This action turned the whole affair into mockery and began in the Japanese that sense of outrage which made them prepare for the possibilities of war, especially as the question of Korea (q.v.) was still unsettled.

In 1876, three years before, Japan had made a treaty with Korea as an independent state, which precedent, curious as it may seem, China assisted the United States, through Admiral Shufelt to follow, looking complacently on also while other nations, England, France, etc., did the same, each treating Korea as a sovereign and independent state. Nevertheless, while the notion of a vassal state's acknowledgment of dual sovereignty was unknown in the West, it still existed in the Chinese mind and the Middle Kingdom gave no sign of yielding her hold upon Korea as a vassal state. There seems little doubt then, that by 1880, the intelligent statesmen of Japan foresaw and the Japanese military men prepared for a war with China. Events and experiences in Korea during the next 14 years served but to change a suspicion into a determination.

When in 1894, this war broke out, it was evident that both nations had made vast progress in both material civilization, and in those gains which are associated with the triumph of mind in law and morals, revealing clearly by startling contrast both the homogeneousness and thoroughness of the progress of the smaller and the looseness of organization in the larger country. Japan, quickly responsive to a central will, seemed like an athlete in possession of all his powers, while on the other hand there was with "the boneless giant" progress only in lines and spots, the work of partially modernizing China having been chiefly that of a few resolute men, while the great body politic seemed to be insensitive, and vigorous for offence and defence only in portions. Strictly speaking, there never was any war between Japan and China, but only a war between all Japan and a few of the maritime provinces of China. The American, Ward, and the Englishman, Gordon, had shown what the average Chinaman could make of himself as a soldier, when properly drilled, commanded and influenced by example. Under these men, Li Hung Chang (q.v.) was converted to the value of the material forces in Western civilization. Adopting these, and being viceroy of provinces nearest to the capital, he organized an army drilled by German officers, and had the promontories of Wei-hai-wei and Port Arthur, guarding the sea gates of the capital, fortified and the Taku forts commanding the Pei-ho River rebuilt according to modern principles of defence and engineering. Gradually an efficient fleet of battleships, cruisers, and gunboats was organized. A beginning had also been made in China of railways and steamship lines. One part of China's vast system of revenue, "the imperial customs" of the empire, elaborated since 1863 under the British Sir Robert Hart, and honestly administered, has given China her surest source of cash income for general purposes and the purchase of foreign equipment of every sort. For an individual or government service to be free from bribery and routine corruption seems to the normal Chinaman something unearthly, and the imperial customs under Sir Robert Hart have won unbounded admiration from the Chinese. In 1894, when the war broke out which did so much to prick the bubble of Chinese prestige of greatness and mass, and which, paradoxical as it may seem, evoked mutual respect and drew the Chinese and Japanese more closely together in reciprocal understanding, China had, in addition to her military mobs in the various provinces, the beginnings of scientific military system. This in time might have become national. Even then as seen to undiscerning foreigners China appeared from a military point of view invincible. On the humane side of provision for sick and wounded soldiers and in the nobler features of civilization, China was wofully deficient. As soon as hostilities broke out the vast difference between the two nations was manifest. China went to war without surgeons, hospitals, nurses, or the manifold apparatus of civilization for protecting non-combatants, saving life and mitigating the horrors of war. China had not yet become a signatory to any of those conventions of nations in the interests of mercy, nor was there a Red Cross organization within her borders. Her recognition of the international code of war was

slow and her acceptance of it slight. On the contrary Japan, having her object lessons given by Christian missionaries had provided hospitals, surgeons, Red Cross Society and equipments for surgery, healing and hygiene, and these were in splendid condition, while 1,400 trained nurses were ready for work. Japan had in 1887 signed the Geneva and other conventions and had diligently educated her army officers in the commentaries and usages of the signatory nations, while her naval commanders were well versed in the laws of search and capture. When in 1894 her fleets and armies went forth into Korea, Manchuria, and China proper, there was with each field-marshal, besides a hospital corps ready to minister to friend or foe, an expert lawyer, versed in international law, who went as adviser to see that nothing was done by the Japanese which should infringe the laws of nations. Two notable books, 'International Law During the Chino-Japanese War,' by S. Takahashi, and 'La Guerre Sino-Japonaise au Point du Vue du Droit Internationale,' by Professor N. Ariga, the one from the military and the other from the naval college in Tokio, are the literary monuments of this habit of the Japanese, which, in 1904, has developed into a college of five international law experts. These, after being consulted at all points during the progress of the negotiations of 1903–4, have gone upon deck and field with the military and naval men into Manchuria to insure, in every detail, harmony with the laws of nations.

The war of 1894–5, which wrought such great results for the world at large, is worth reviewing in its main outlines, since it blew to pieces and forever China's doctrine of Whang-ti, or world-sovereignty, the tenacious adherence to which over Korea had brought on the war. After being again served by China as they had been in the Riu Kiu matter, the Japanese determined to take no further chances with her rulers. In Korea, after the bloody struggle in Seoul between the native Liberals and Reactionaries in 1884, followed by the armed conflict between the Japanese and Chinese troops, a convention was made dated 7 May 1885 between Li Hung Chang and the Marquis Ito, that both governments withdrawing their troops, would not again land soldiers in Korea without mutual agreement. For awhile there was peace in the Land of Morning Calm, but when the Tong Hak uprising took place, the soldiers from Seoul were overcome and the whole kingdom seemed to be in danger of anarchy, the pro-Chinese faction at court asked for aid from Peking to put down the rebels. Then to the amazement of the world the Chinese government violated the treaty of 1885 by first forwarding troops and then notifying the Japanese minister in Peking, using the words «our tributary state» concerning Korea. China thus reasserted her ancient claim of suzerainty over Korea as a vassal state, notwithstanding that Korea had been recognized as sovereign and independent by Japan and other nations. The government in Tokio interpreting this as a direct insult, on 12 June 1894 announced the despatch of a body of troops under strict discipline to Seoul and five days later invited China to undertake with Japan financial and administrative reforms in Korea in order to preserve the peace of the Far East. The Peking government curtly refused and demanded the recall of the Japanese troops. The reply from Tokio was that pending an amicable settlement of questions in dispute, any further despatch of Chinese forces into Korea would mean war. China had already ordered her soldiers in Manchuria to cross the Yalu River, and having chartered the British ship Kow-Shing despatched 1,100 soldiers to reinforce the Chinese camp at Asan in Korea.

What follows the world knows. With astonishing secrecy and celerity, the armies of Japan occupied Korea and after the decisive battle of Ping Yang drove the Chinese out of the peninsula, crossed the Yalu and in Manchuria conquered an area larger than their own empire, while her navies wiped the Chinese fleet off the ocean and captured the great fortresses of Port Arthur and Wei-hai-wei. After annihilating nearly all the drilled troops of China at Ping Yang, the Japanese fought military mobs, making war chiefly with the forces of only a portion of the empire. During the war the majority of the Chinese people scarcely knew that there was any real hostilities adverse to their empire, nor did they learn for years afterward just what had happened, but the military success of Japan opened the eyes of Europe and enlightened some of the Chinese mandarins and scholars. To-day we find China with a new army, formed on modern principles and drilled chiefly by Japanese officers, while in June 1904, having become a signatory to the Geneva and other conventions made to mitigate the horrors of war, she has entered still the pale of civilization, which means the world in brotherhood.

The Japanese stung to the quick, because neither China nor Western nations had recognized them as highly civilized people, were confirmed in their pride and resolve to make the so-called white race understand and appreciate them, when Russia, France, and Germany joining to deprive them of the lawful fruits of conquest, forcibly compelled them to be satisfied with the cession of Formosa and indemnity in money. Had the Japanese been possessed of four battleships, they would in 1895 have declared war against Russia. As it was, they who never forgive an insult, resolved to nurse their wrath, keep it hot by buying battleships, and in cool science and unwearied perseverance began to invent explosive powders, perfect munitions and equipments and enlarge an army and a fleet that should some day wipe out the insult, and show that the Japanese count none on earth as their superiors. Meanwhile China, profiting by her fresh experience in humiliation, began to inquire more earnestly into the secrets of Western power. A tremendous impetus was given to the reading of all kinds of information about Japan and the Western nations, to the building of railroads and to the renovation of educational methods. The ferment of ideas caused something like a great reform movement in 1897, which, led by progressive literati and apparently sanctioned and even controlled by the young emperor, seemed apparently about to sweep over the whole empire. New schools and universities were planned and a newspaper called 'Chinese Progress' was published. The purchase and sale of official rank was to be abolished. The stirring and patriotic brochure «China's Only Hope,» recommended

by the emperor, fed the flaming zeal of the reformers who were led by Kang Yu Wei. Even the abolition of the queue, the changing of the Chinese national dress, the adoption of the Christian religion, the calling of a national parliament and a journey of the emperor and empress dowager to Japan to see for themselves the pitiful condition of China were advocated in memorials. Reform seemed to be ready to spread like a prairie fire, when suddenly in September, Li Hung Chang was dismissed from office and the emperor virtually dethroned by the Empress Dowager. This act "carried within itself the fruitful seeds of the Boxer outbreak." Yet although the missionaries felt what was in the air, the diplomatists looked on the episode as a "Manchu family quarrel," and ignored the warnings of those living close to the masses of the people.

Meanwhile the disturbing influence of American prosperity and expansion were felt in both Europe and Asia. Within a year after Pittsburg achieved the supremacy of the world in the making of cheap steel, Russia, Germany and Great Britain "precipitated themselves upon the shore of the Yellow Sea, grasping at the positions which had been conquered by Japan and for the same reason,"— to obtain possession of the rich coal and iron deposits in Shansi, said to be "worth ten Pennsylvanias." Germany seized Kiao Chau, Russia Port Arthur and Great Britain Wei-hai-wei, in readiness for the supposed impending "Break-up of China" and its expected partition. The torpedo that sunk the Maine in Havana harbor interrupted the European programme, postponed the partition of China, and united the British, Americans and Japanese in the determination to keep China intact and the door of commerce open. In 1900 the United States, now a world power, was in Asia with force and had a policy — the policy of freedom and uplift — which for a century or more, the Americans in Asia, as traders, teachers, healers, and apostles of democracy and fair play had been steadily developing. Meanwhile in China the old territorial integrity could not be so ruthlessly violated nor the ancient social systems invaded without protest. The introduction of railways had thrown thousands of men out of old methods of employment. The tremendous commercial intrusions, which disarranged old customs and made the problem of livelihood to millions so very serious, brought on a fierce reaction both of the scholars and the people and especially of the Buddhist priests, creating an atmosphere and environment most favorable for the outbreak of another of those sectarian revolts against the official orthodoxy of China, to put down which the Chinese have shed more blood perhaps, than all the religious wars and inquisitions of Europe. This time the heresy was joined with and the cry raised in the name of patriotism. The heretics became the people called "Boxers" or the Fists of United Harmony. The triple pressure of hunger, superstition and patriotic revolt at the territorial incursions of the foreigner at last burst out into a storm, which in blind wrath against everything alien, smote first the railways and foreign workmen and then the teachers of the foreign religion and their converts. The mob reached Peking and surrounded the legations, which were hastily isolated, fortified and for months successfully defended. The foreign powers hastily made preparation to defend and then succor their nationals, but the United States seemed to be the only one that beside its prompt despatch of a military force had a definite policy, which was in recognition of the sovereignty of China to relieve its own citizens and then withdraw its military from Chinese soil. It is absurd to suppose any real harmony or co-operation between the orthodox Chinese government and the heretical Boxers. Whatever be one's opinions on the subject or the form of the encouragement alleged to have been given directly by the Empress Dowager, it is a fact that no hostile shot was fired by a Chinese regular soldier or sailor, until the seven allied nations, in which the Americans were not included, had made war on China by firing on the Taku forts, 17 June 1900. Against this unwarranted proceeding and overt act of war the American Admiral Lewis Kempff protested, and in the crime of attacking peaceful Chinese he refused to participate, his conduct becoming the basis of the triumphal diplomatic policy of the United States government. Briefly stated, the situation was this: A riot of fanatical sectarians, moved by economic and patriotic motives, rose in rebellion against the government already impoverished and weakened by foreign aggression. When unable to put down the uprising in Shan-si, the Pei-ho valley and the vice-royalty from which Li Hung Chang had been removed — though the whole Boxer movement was wisely handled and thoroughly suppressed by able viceroys in the central and southern parts of China — the seven allied nations made war on China in the bombardment of the Chinese forts. When also the Chinese, of course, attacked their enemies in Siberia, the Russians perpetrated the massacre at Blagovestchenk and then marched their soldiers to Peking. The combined relieving force fought the opposing Chinese. The Japanese, having the largest and best furnished of the contingents, led the van. The Russians as very slow marchers came next, so that the American and British contingents had to march during the hottest hours of the day. It is certain that the celerity, character and discipline of the Japanese soldiery on this expedition excited the surprise and admiration of military critics of every nation represented, while on the other hand the familiarity of the men of Nippon with those of Muscovy bred contempt of Russian slowness, heaviness and low grade of intelligence in the *mujik* or common soldier of the czar.

After the capture of Tientsin 14 July, the Japanese or Americans alone could then have pressed on and relieved Peking within a fortnight, but jealousies and unnecessary delays kept the relieving column idle until 4 August. The unspeakable robberies, violation of women, brutalities and generally barbarous conduct of the most of the European troops, by the way and in the capital, demonstrated the hypocrisy of the claim to be called Christian and in contrast to the conduct of the Japanese proved that the terms "Oriental" and "Occidental," as applied to morals, are purely traditional and destined soon to pass away. The Imperial city was captured on 15 August, the Chinese court escaping to the westward and remaining away from Peking until January 1902. On 28 August bodies of soldiers, representative of the

eight allied nations, marched through the Forbidden City as a token of China's humiliation. Li Hung Chang was recalled to office and with Prince Chang commissioned to treat with the Powers, only one of whom, the United States, seemed to have a definite policy. During the "peace" negotiations, the Europeans kept up a series of attacks and massacres of Chinese called "punitive expeditions" which in general character were a disgrace to civilization. An indemnity equal to $330,000,000 was imposed on the Chinese government in expiation of the Boxer outrages, and for her self defence in the war following the attack on the Taku forts. Various safeguards for the legations were arranged and agreed to, the importation of arms and ammunition prohibited, and the Tsung-li Yamen was transformed into the Ministry of Foreign Affairs which was to take precedence of the other ministries. Except legation guards, the foreign troops were to be withdrawn in September 1901. The Imperial edict of February 1901 accepted the terms imposed. On 9 April 1902, the Manchurian convention between China and Russia received the imperial seal. The Russians were to evacuate Manchuria within eighteen months, but to retain control over the railroads.

It was after this Boxer uprising that what we have called the Russian and the American foreign policies and systems of diplomacy had by contrast their most signal illustration. As soon as order was restored and the preliminary diplomatic arrangements made, the United States recalled all its military force, except a small legation guard, asked no favors in return for what had been done, and not only emphasized her recognition of China as a sovereign Power, but set a commendable example to the other governments by dealing justly with the Chinese in the matter and method of payment of the indemnity, thus illustrating again the fixed American policy of helping rather than taking advantage of Asiatic nations. Russians, on the contrary, demanding the right to occupy Manchuria with her troops and to make Port Arthur the terminal of her Siberian railway, began thenceforth the military possession of Manchuria, the building of the city of Dalny (q.v.), and the making of Port Arthur (q.v.) both a city and an impregnable fortress, and initiated various other enterprises on a vast scale, costing hundreds of millions of roubles, all of which suggested a prospective ownership in fee simple, rather than temporary occupation, notwithstanding that she solemnly covenanted to evacuate on the 8th of October 1903. The United States believing in the good faith of the Muscovite government and in accordance with her policy of recognizing China's sovereignty, appointed consuls for the three cities in Manchuria which by treaty agreement were to be thrown open to the trade of the United States. When the appointed time drew near, there was no indication of any purpose on the part of Russia to keep her agreement. As early as 28 July 1903, the Japanese government expressed to Russia its alarm at the Manchurian situation. When Russia formulated new demands at Peking and seemed to consolidate rather than relax her hold on Manchuria, showing also increased activity along the Korean frontier, doubts were raised in Tokio as to the limits of Russia's ambition. Through his minister in Tokio, Baron Komura and his envoy, Mr. Kurino in Saint Petersburg, the Mikado notified the Czar through Count Lamsdorff that wishing to remove every cause of future misunderstanding he desired to enter "upon examination of the condition of affairs in the Extreme East, where their interests meet, with a view to a definition of their respective special interests in those regions." Negotiations were opened and after long delay on the part of Russia the Czar announced that while willing to respect the independence and territorial integrity of Korea, Russia declined to extend the same engagement to China and requested Japan to acknowledge Manchuria and its littoral as entirely outside her sphere of interest. The Czar furthermore requested the limitation of Japanese control in Korea, even proposing a mutual zone covering all Korean territory north of the 39th parallel. Other negotiations, followed by exasperating delays in Saint Petersburg, took place, Russia meanwhile heavily reinforcing both her army in Manchuria and her fleet in eastern seas, purchasing and transporting also large stores of ammunition and coal to Port Arthur. On the 5th of February, Japan telegraphed the termination of her negotiations, severing diplomatic relations with Russia and withdrawing her legation. Then followed hostilities, begun simultaneously, both parties claiming that the other had fired the first hostile shot. In the war that followed, the Japanese surprised Europe with the rapidity and brilliancy of their victories on land and sea, China remaining neutral except to take precautions against the violation of her frontiers. At the request of the German Emperor, the American secretary of state urged upon three of the nations most interested, the limitation of the area of hostilities, to which they promptly responded. From the side of the Japanese it must be remembered that they were smarting under the sense of long-continued Russian aggression in Saghalien and the Kuriles, begun very early in the 19th century. In 1861 a Russian man-of-war proceeded to the island of Tsushima, on which the Russian flag was hoisted and a settlement was made (though not until Japanese blood had been shed in resistance), which would have constituted a title of ownership had not Great Britain interfered. The Russians were finally compelled through British intervention to abandon their claim and leave. By the usual plan of "joint occupation," which in the Ussuri province of the Chinese empire had ended in China's loss of a territory as large as France and its incorporation into the Russian empire, the Russians gained complete possession of Saghalien. After the restoration of the Empire in 1868 it was foreseen by the Japanese statesmen that Russia would be their chief danger, for already signs of her movement in Korea were menacing. This fact was the strongest determining element in the creation in 1871, in place of the old clan contingents, of a powerful army and navy for national defence.

It is more than probable, as history has clearly shown in the past and as the racial constitutions intimate, that progress in Japan and China will proceed from varying levels and in different channels. In the island Empire the centre of national life is in the one unchanging dynasty and national amelioration has issued from the government downward. Any sure advance for Japan in the future will be from the

same source and in a similar direction. On the contrary among the Chinese people, to whom the existence of this or that dynasty makes no vital difference, reform will arise in and proceed through their social system and not from throne or court. In China real and permanent progress has been less through anything done in Peking than directly traceable to the work of men who rose from the people and who had been instructed by foreign diplomatists, teachers or missionaries. These men have trained the people through the schools, the press, the churches and the hospitals, reaching all parts of the empire by means of the printed word, book, tract, newspaper, or by personal influence upon China's leading men, whether in or out of office. In Japan before Perry's advent there were hundreds of men already enlightened, keeping eye on European aggression in Asia, and moving for the unification and reform of the nation. The great motive supplying the force of their lives came from no foreigner but from their own inborn patriotism and self sacrifice. Nevertheless, when fullest credit is given to the propulsive power of her Bushido, or the Knightly Code, it must be remembered that Japan, after her first contact with Europe, never was truly a hermit nation. For two hundred years or more the Dutch at Nagasaki fertilized the Japanese mind, keeping open not only the door of outlook on and information from Europe, but nourishing the Japanese intellect with exact science, varied knowledge and the applications of occidental methods especially in medicine and the mechanical arts. In 1853 it was strenuously charged by the Conservatives who wished the country kept shut that only the native "Dutch scholars" wanted the empire opened to commerce and western influences. In 1868 when the men rich in Dutch culture and the "Mikado-reverencers" gained possession of the imperial person in Kioto, they began to relay the foundations of the empire by seeking for knowledge in every part of the world. Teachers, advisers, engineers and experts of all sorts were imported by the hundreds, who during thirty-five years have literally taken off their coats and, by example and teaching, redecraft and handicraft have shown the Japanese how to do those very things which they are now doing so well. The configuration of the Japanese Islands has fitted them to profit to an extraordinary degree by the adoption of the forces of steam and electric communication at a time most needed, that is, immediately after the abolition of feudalism and in the transit to industrialism helping to unify them politically and consolidate them into a marvelously compact nation. In China, railways will re-distribute into wholesome evenness of proportions of tableland and littoral, the population now congested in the river valleys and alluvial plains, will develop and distribute the wealth of the mines, will abolish the almost periodical famines, and by adding healthy movement and contact of the inhabitants of distant provinces develop in the Chinese that patriotism (as distinct from race pride which is already so intense), the lack of which has been the cause of China's many woes, and will give that middle term of a large intelligent and practical body of men of affairs between the throne and the masses, so notable in Japan and which China so sadly needs. The progress in both Japan and China has necessarily been thus far mostly of the material, educational, and economic sort, for neither the Chinese nor the Japanese take kindly to the abstract thought or science of the West. It is an exceptional thing to get a Japanese or Chinese to listen patiently to the presentation of even the outlines of a metaphysical or abstract argument or proposition. Hence, therefore, in its doctrinal form, Christianity has made but slight progress, and the chief experience noted by foreigners in the reception of an Occidental creed of any historic name by Chinese or Japanese has been its simplification. It seems quite certain that Christianity as known and practised by the countries of the Extreme Orient is to a very hopeful degree expressed in practical forms or in reform. Nor is it at all likely that in accepting what Jesus taught these peoples will ever receive or assimilate also that Greek philosophy, Roman tradition and doctrinal achievement, and the ethnic peculiarities which form so large a part of popular Christianity in America and Europe.

The chief role which the Japanese are to play in the future — with probably the development of reserves of power greater than the average Occidental suspects in them — will be as the teachers of the Chinese, who number one fourth of the population of the world, by interpreting to the sons of Han the civilization and systems of the West, themselves acting as the middle term between Occident and Orient.

This article does not pretend to picture or set forth in detail the external progress which Japan and China have made in revenue or development of natural resources, or to tabulate by statistics the possession of the material forces of the West as seen in railways, steamships, lighthouses, telephones, etc., and the manifold application to the comforts and conveniences of life of western inventions. So long as the ideas bred by a rigid Confucianism or the hardening of those ancient Chinese and Japanese traditions and dogmas which once were living forces of progress, but which have long since become obstacles to growth, prevailed in these lands, there could be no real progress. All changes which seemed progressive would be mere surface efflorescence rather than organic and vital growths. With the adoption of universal principles of truth, as formulated in science and illustrated in the lives and work of good men and women, the old mists of superstition pass away, the matted growths of tradition are plowed up, and the mental soil of the Chinese and Japanese lies open to receive the seeds of new and perennial progress. Those who look beneath the surface have every reason to believe that the progress of the past fifty years in China and Japan has been as genuine, and will be as fruitful for the good of the race as that made in the western world.

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China Decoration. The decoration of china, and, indeed, of all kinds of clay wares, falls into two groups: (1) Controlled by method, and (2) controlled by producer. The former group deals with the fact that a decoration can be introduced at any stage of the manufacture; the latter concerns itself with the various handicrafts employed.

Decorations may be used under the glaze, either on the unburned or burned clay; in the glaze, as a natural coloring; on the glaze, after the hard-glaze fire.

Decorations on the clay usually take the form of *sgraffito* (incising); inlaying, or *pâte-sur-pâte;* or painting with diluted clay. In the two latter it is important that the inlaid or overlaid clay should be similar in composition to the main body, or the fire will cause them to separate. The body piece, formed either in a mold or upon the wheel (see POTTERY), is kept quite damp, and the design, lightly sketched in India ink, is carefully followed. In inlaid work a channel is tooled out of the body, and filled in with clay of a different color. In *pâte-sur-pâte* no cutting out is necessary, but usually the background is stained a dark color and the design is laid on in white. The beautiful works of M. Solon are of this class.

On the burned ware under-glaze decoration may be either painted or printed. Most of the modern hotel and restaurant ware is printed under the glaze.

For some classes of work a coloring added to the glaze itself is very effective. By this means are produced the flowing and flashed effects much followed by the Japanese and by many French ceramists. In America the Dedham Pottery has worked in this direction.

For work over the glaze a lower fire is employed, many more colors are available, and the processes of decoration include painting, gilding, printing, and ground-laying.

Ceramic colors are made from certain metallic oxides with which are blended a fusible flux, so that the mixture may melt and attach itself to the glaze. Various fluxes are in use. They are composed of red lead, borax, and quartz sand in varying proportions. These ingredients are melted together, and the resulting glass is finely ground. For blues the oxide of cobalt is used; for greens, those of copper and chromium; for yellows, antimony and lead; for reds and browns, iron; for dark brown, manganese; and for grays, nickel and iridium. Gold produces rose color and purple, and a pink is also made from tin oxide and chromic acid. In some cases the colorant and the flux are melted together; sometimes they are united only in the grinding-mill. For under-glaze work, as well as for the coloring of clays and glazes, the list is not so full. Some of the oxides fail under the higher temperature, and must therefore be confined to over-glaze use.

In the second group, decoration is considered as a handicraft. Division of labor is the rule in a manufactory, and thus a piece of china may pass successively through the hands of the ground-layer, the painter, the printer, and the gilder, together with those of many minor operators. To the ground-layer falls the task of distributing an even tint over the whole piece or upon some part of the design. Using a stiff oil, —linseed boiled with litharge or lead acetate.— he dilutes it with turpentine, and brushes a thin coating over the china. This coating he dabs with a soft linen pad, and then spreads the color, which is a fine dry powder. A certain quantity adheres to the oil, and a smooth tint is the result. If only part of a design is to be covered, the free portions are painted with a water-color mixed with molasses. The work is oiled and dusted as before, and is then immersed in water, when the water-color is washed up, taking with it any of the ground color which may have settled upon it.

The painting of china scarcely needs a description. The colors are as already explained, and the painting depends upon the personal skill put forth. The colors are mixed in turpentine and fat oil just as the painter pleases, for each artist mixes his own palette. The colors change somewhat in the fire, but not as much as is often supposed. The main difference is a great gain of brilliance.

The gilder is mainly employed to embellish the work of others. He uses pure gold, as pure as it can be purchased. This is received in the form known as "coffee gold," a brown granular mass. Mercury is added of about the same weight as the gold and the whole is ground perfectly fine. When mixed with the proper oil this can be used freely as a paint, and the oil and mercury are driven off in the fire. Gold thus prepared needs to be burnished after firing; but there is another form of gold, known as bright or liquid gold, which is much cheaper, and therefore largely used on common wares. In this case the gold is dissolved and the solution is mixed with certain oils. The fire removes everything but the metal, which is left as a brilliant film on the china.

Printing from copper plates has been in use ever since 1756, but for many years has taken an inferior position. At first it was employed for fine engravings and decorative subjects, but lately only for borders and outlines. The pattern is engraved upon a plate of planished copper, and the printer makes this plate quite hot upon his stove. The color, mixed in a very stiff oil, is also kept hot, and with this the engraving is charged. An impression is taken upon thin paper, and this print is handed to a woman who cuts away the superfluous paper and presses the print on to the china. A bath of cold water removes the paper, and the color, rendered hard by the low temperature, remains firmly fixed. The fire completes the process.

Lithographic printing is now very popular in china decoration. The process was introduced from France some 12 years ago, and for a long period the prints were made abroad, but recently the more successful manufacturers have established their own lithographic departments. The prints are made in the usual way from stone, except that no color is applied to the stone itself. The impression is taken in varnish, and the color is dusted on the printed paper. On account of the transfer the order of impression is reversed, the print which is first on the paper becoming uppermost when the impression is transferred to the china. The paper used is double, consisting of a sheet of tissue paper cemented on to a stiff backing. The stiffness is necessary to withstand the pressure of the machine, and when printed the tissue is stripped from the sheet and proves flexible enough to accommodate itself to the surface of the ware. The printing is done in vitrifiable colors, of course, and the finished china is fired in the usual way.

China, Great Wall of, the largest artificial structure on the face of the earth, a barrier extending for about 1,500 miles in the north of China Proper, of which it partly forms the boundary. Its western end is in the deserts of

central Asia, its eastern reaches the sea to the northeast of Peking. It was erected as a barrier against the inroads of the barbarous tribes, and dates from about 214 B.C. It is carried over height and hollow, and avoids no inequality of the ground, reaching in one place the height of over 5,000 feet above the level of the sea. Earth, gravel, brick, and stone were used in its construction, and in some places it is much more substantial than in others. Its greatest height, including the parapet on its top, is about 50 feet, and it is strengthened by towers at regular distances.

China Ink, or **Indian Ink,** a black solid substance, which, when rubbed down with water, forms a very pure black indelible ink. It has been used in China from time immemorial, and both there and in Japan is employed for writing, small brushes being the implements made use of. In Europe it is used by draftsmen, artists, etc. It is manufactured in various ways and from various materials, but consists essentially of fine lampblack incorporated with a gluey substance, the whole being dried and consolidated into cakes and sticks. Some kinds are made with animal or ivory black, others with lampblack got from camphor or oil of sesame. There is generally added some perfume — a little musk or camphor. Many attempts have been made to imitate Chinese ink, some of which have been tolerably successful. Almost all the imitations consist of carbon ground up with gum, gelatine, or fish-glue, but the quality and tint may vary according to the special carbon employed and the process of manufacture. Good Chinese ink should have a velvety black appearance, with a gloss which becomes very conspicuous on rubbing. The color it gives on paper should be pure black and homogeneous, and if water be passed over it it should not run or become streaky. See INK.

China Root, the root or rhizome of *Smilax china,* a climbing shrubby plant closely allied to sarsaparilla, for which it is sometimes used. *Vitis sicyoides,* a species of vine, is known by this name in Jamaica.

China Rose, the name given to a number of varieties of garden rose chiefly derived from *Rosa indica* and *R. semperflorens,* both natives of China. The name is also given to *Hibiscus rosa-sinensis,* one of the mallow tribe, common in China and the East Indies, and an ornament in greenhouses.

China Sea, that part of the North Pacific Ocean bounded on the north by Formosa, on the northwest by China, on the west by Anam and the Malay Peninsula, on the southeast by Borneo, and on the east by the Philippines. It contains numerous islands, receives several considerable rivers, and forms the important gulfs of Siam and Tongking. The currents in this sea are very mutable, depending much upon local circumstances.

China-tree, Wild, a common name for the soapberry-tree (*Sapindus marginatus*). It is a handsome tree, sometimes growing as high as 60 feet. The flowers are white and the oval berries are very saponaceous. It grows from Florida westward to Arizona and northern Mexico, and in southern Kansas. The wood is very hard, and heavy, weighing nearly 60 pounds to the cubic foot.

China-ware, the name given to porcelain made in the Chinese empire and imported as "China ware," now chiefly confined to the soft porcelain made in England, of which bone-ash is the characteristic ingredient. This class of ware is called "bone china" by the potters and dealers of America.

Bone-ash was used at Bow and at Chelsea, near London, as early as 1750 and has been extensively employed ever since. Bone china consists of kaolin, pigmatite, or Cornwall stone, and bone-ash. The clay and rock are found in Cornwall, England; the bone is largely imported from America.

The proportions in a dry mix are about as follows: Kaolin, 40; stone, 20; bone-ash, 40. The heat at which the kilns are burned ranges from 2,300° to 2,400° F. Bone china is not made to any great extent in America, though some few manufacturers have put it forth as a side line. The particular merits of this ware lie in its snowy whiteness, and in the soft glaze which makes it possible to produce very beautiful decorations over the glaze. For rich services this class of china is unrivaled. See PORCELAIN.

China Wax. See WAX.

Chinandega, chē-nän-dā'gä, Nicaragua, a town 26 miles northwest of Leon, and 10 miles from the port of Corinto on the Pacific, with which and with Managua it is connected by rail. It is a place of considerable trade. Pop. about 11,000.

Chinch, the popular name of certain fetid American insects of the family *Lygæidæ,* genus *Rhyparochromus,* resembling the bed-bug, very destructive to wheat, maize, etc., in the southern and western States. The name is also applied to the common bed-bug (*Cimex lectularius*).

Chincha (Chēn'chä) **Islands,** a group of small islands off the coast of Peru; lat. 13° 38′ S.; lon. 76° 28′ W. They are granitic, arid, and destitute of vegetation, and the coasts bold and difficult of access. Immense deposits of guano used to exist here, but after being exported for 34 years the supply became exhausted in 1874.

Chinchaycocha, chēn-chī-kō'chä, a lake of Peru, in the department of Junin, 13,330 feet above the level of the sea; 36 miles long and 7 broad, with an area of about 300 square miles. It is the source of the river Jauga, and abounds in fish and wild fowl.

Chinchilla, chĭn-chĕl'yä, Spain, a city in Murcia, in the province of Albacete, 10 miles southeast of the city of that name; situated on a rocky eminence. It is surrounded by a wall and commanded by a castle. Its handsome parish church has three naves, and a lofty tower containing six bells; the interior is richly decorated and contains pictures and other works of art. Quarries of granite, alabaster, gypsum, and limestone are wrought in the vicinity. Pop. 6,500.

Chinchilla, chĭn-chĭl'la, a genus of South American herbivorous rodents allied to the cavies, which they resemble in the general shape of the body, in the limbs being longer behind than before, in the conformation of the rootless molars, and by the nature of the fur, which is more woolly than silky. *C. lanigĕra,* the only species, is about 15 inches long from the muzzle to the tip of the tail, and is covered with a beautiful pearly-gray fur, which is highly

esteemed as stuff for muffs, pelisses, linings, etc. The chinchilla lives gregariously in the mountains of western South America, and makes numerous and very deep burrows. It is gentle and sportive, loses none of its gaiety in captivity, and is very cleanly. This genus gives its name to the family *Chinchillidæ,* which contains two other genera, one (*Lagidium*), including a large chinchilla-like rodent of the Andes; and the other (*Lagostomus*), containing that large numerous burrower of the pampas called vizcacha (q.v.).

Chincholle, shăn shŏl, **Charles Henri Hippolyte,** ĭp-pō-lēt, French novelist: b. Chauny, France, 16 July 1845; d. Paris 21 Aug. 1902. In the earlier portion of his career he was secretary to the elder Dumas, with whom he occasionally collaborated, and from 1872 was a member of the staff of 'Figaro.' He was an extremely versatile writer, but his style is wanting in finish. Beside his one-act farce, 'Oncle Margotin,' which ran 300 nights in 1870, and 'Le Mari de Jeanne' and other plays, his romances and other works include 'La Plume au Vent' (1865); 'Alexandre Dumas Aujourdhui' (1867); 'Les Pensées de tout le Monde' (1868); 'Dans l'Ombre' (1871); 'Le Lendemain de l' Amour' (1880); 'Le Catalogue de l' Amour' (1881); 'Paula, Histoire d' une Neurosée' (1882); 'La Ceinture de las Survivants de la Commune' (1884); 'Le Vieux Général' (1886); 'Femmes et Pois' (1886); 'La Grande Prêtress' (1887); 'Biographe du Général Boulanger' (1889).

Chinchon, chēn-chōn', Spain, a town 25 miles southeast of Madrid. After a Countess of Chinchon, wife of the governor of Peru in 1638.

Peruvian bark was named "chinchona," now habitually misspelled "cinchona."

Chinde, Africa, a town on the only navigable mouth of the Zambezi. Here the inland steamers meet the ocean steamers of various European companies; and here, too, Great Britain has obtained from Portugal a small piece of land called the "British Concession," for commercial purposes, and a residential district called the "Extra Concession."

Chinese Arrowroot. See NELUMBIUM.

Chinese Architecture and Art. The fine arts in China are as varied in character and as rich and tasteful in design as those of the peoples most successful in art; but they are known to Europeans in a very unequal fashion. Thus the architecture of the vast country, contained in the old provinces of China, as large as the United States west of the 100th parallel, and as diversified in soil and climate, is so little known that the essays on the art written even by former residents in China deal obviously with certain very limited places only — the neighborhood of a certain city, the borders of a certain river, and the like — and are, moreover, the studies of men not conversant with the construction or with the decorative buildings of any part of the world. The history of this architecture is yet to be written. The photographs now obtainable, having been made during the years since 1890, open up a new world of architectural art. It is enough to say here that there exist two systems of building: the one being a framed construction, usually of wood and capable of great elaboration, the other a solid masonry construction carried out in brick or stone according to the resources of the neighborhood and the cost of the building. The framed system of building is closely akin to that used in Japan; and it is there that we can best study the wooden temple-tower and the wood-framed hall of reception. As for the masonry buildings, they are often large and massive, as is well known to all who have observed the walls and gateways of the great fortified cities and the famous "Great Wall" which protected Pekin and its neighborhood from northern invasion. In the way of more decorative buildings less is known of the system of design, but several peculiarities may be mentioned. Thus there is a marked preference for the octagonal form in towers, and everywhere throughout the central provinces these buildings, called by the Europeans pagodas, rise above the hills and show over the groups of houses. The often cited use of the polygonal arch, that is, one with the intrados at least many-sided instead of curved, is to be noted as indicating how much that is attractive we have still to discover. The decorative gate-ways (pailoo) corresponding nearly to the *torii* of Japan and to those edifices called *toran* in the peninsula of India, are often admirable designs in the way of purely decorative architecture, monumental architecture, having no direct utility. The dwellings of the Chinese, even the palaces of the princes, do not seem to include many-storied and ponderous structures, but cover immense tracts of ground with gardens, among which stand buildings of no great height, but of a singular beauty of construction, especially in the roofs, and very richly decorated within. The dwelling-houses of the people are generally walled with brick and are not striking in their external appearance. The roof is an especial feature in Chinese art. It is commonly built with a hollow upward curve, the result of a very interesting system of construction, with light wood-work. This slightly concave surface covered with glazed ridge-and-furrow tiles richly colored, is an important feature in Chinese architectural composition. Painting in strong pure colors is a recognized element of external design; and it has been truly said that the special and distinguishing feature of Chinese exteriors is gaiety. Even the slightly-built one-story shops of the great towns are bright with vermillion and green; and the signs, painted with the very ornamental Chinese ideographs, help in this effect.

Chinese painting reached a great development as early as the 8th century A.D.; and there is every probability that it had then been a great school for several centuries. Landscape was one of its especially favored branches. While in Europe no one dreamed of landscape art for its own sake, the Chinese impressionist designers were producing admirable studies, both in color and in monochrome. Some few of these are in European museums, their authors and dates having been fixed by careful comparison, but the much more modern Japanese landscapes, in painting, monochrome, and wood-cut, are the best material from which to gain a general idea of that ancient landscape art. A highly religious art was developed in the 12th century A.D. At that time Buddhist religious feeling was strongly expressed in the art of some painters, while others affected rather a kind of decorative realism, that

1. Enameled [illegible] Vase (Ming, 1[illegible] Thon. 8. Emb[illegible] [illegible] Screen. 4 Porcelain [illegible] in porcelain. 7. Tea-pot, from [illegible]

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1. Enameled plate on copper. 2. Porcelain vase (Siwen te, 1426-1436). 3. Painted Screen. 4. Porcelain Vase (Ming, 1368-1644). 5. Snuff-flask, in green glass. 6. The War-God, Kwan-ti, in porcelain. 7. Tea-pot, from Thon. 8. Embroidered altar cloth. 9. Silk embroidery. 10. Comb for the hair.

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is to say, a close observation of natural objects used to inspire and to influence a highly decorative system of design. These paintings have been little known to Europe, because they are preserved in temples and almost inaccessible palaces; and again it is Japan which has opened to us, through her own art, a knowledge of the older arts of China. A few ancient paintings known to Europeans are of surprising interest; and they open up to us a whole system of design in form and color on the flat surface, which the West is now studying, much to its own advantage. The paintings best known to us are of some purely decorative character, those on porcelain having attracted the attention of Europe ever since the 16th century. These paintings are closely connected with the system of inlay which in the form of cloisonné enamel (see ENAMEL) is another of the great art industries of China. The porcelains affect a more close and careful study of the natural forms in flowers, trees, costume of figures and the like, whereas the enamels are more severe and are confined more closely to the making of admirable patterns; but the two systems differ only as one and the same artist might change his style according to the material and the demands upon him. A similar method of decoration by the free use of natural forms, conventionalized but still retaining much of their character, is seen in the splendid embroideries which have been little known to the West until within a few years. The textile fabrics of China — silks, brocades and velvets — have been known to collectors for many years, but very few national museums have provided themselves with any number of them: they present an inexhaustible treasure of beautiful design in strong and positive colors. It may be stated here that brilliant color is a specialty of the Chinese artist. Where, as in a fine cloisonné enamel, a Japanese artist works in dark and sombre colors, the Chinese will use a sky-blue ground, upon which an elaborate pattern is carried out in deep ultra-marine blue, violet, reddish-gray, dark green, apple green, vermillion, bright yellow, and white, with dividing lines of gilded metal, and many passages of gradation from one color to another. No people have equaled the Chinese in the decorative use of bright, pure colors.

Sculpture in the sense of a grand and permanent art of form is less the business of the Asiatic artist than painting, or than decoration properly so-called. Sculpture in the form of carving in ivory and wood and bronze figures of small size, has always attracted great attention in China and has reached an extraordinary state of excellence in spirit, movement, and skilful composition. Thus, a bronze figure will express perfectly the character and the sentiment of the occasion, while yet losing nothing of its sculpturesque value; and a group of «The Seven Wise Men» seated around the trunk of a bamboo will be rendered in cheap glazed pottery or in minutely carved ivory with equal skill and at a price proportionate to the labor expended and the prime cost of the material.

The ivory group may have cost, when new, a hundred times as much as the piece molded in clay, fired and then glazed and painted, but it is not on that account a finer design, the characters are not more perfectly expressed nor the attitudes of the figures more forcible or more harmonious with each other. This is a great evidence of an old traditional skill of sculpture excelling in the larger as well as in the smaller scale of work. Relief sculptures, especially those in wood, in soft stone and in the surface of lacquer, which has generally a wooden background prepared to receive the impressed and sculptured coat of the viscous material, are as effective for their decorative purpose as are the sculptures in the round. Finally there must be mentioned the lapidary's art, in which the Chinese have always excelled, for the most marvellous carvings in agate, jade and rock crystal, that is to say, in the hardest materials known, are unmatched in the world, and they are as artistically perfect as the carvings in the softer stones; their essential characteristics perfectly understood and always observed. The conventional way of rendering in hard material the most delicate leafage and sprays of twig and blossom is perfectly maintained: and the brilliant polish which is one of the beauties of these carvings is carried through beneath those delicate undercut sprays.

RUSSELL STURGIS,
Author of 'Dictionary of Architecture.'

Chinese Bible, The, a work compiled and partly composed by Confucius, divided into five books:

1. Called the 'Yih-King,' a treatise on cosmogony.

2. Called the 'Shu-King,' the acts and maxims of Yaou, Shun, and other ancient kings held in religious veneration.

3. Called the 'Shi-King,' which contains 311 sacred poems.

4. Called the 'Ee-King,' or book of rites, containing maxims and directions for everyday life and all conditions of men.

5. Called the 'Chun-tsien,' a history of Confucius' own times.

Chinese Cæsar, The, Kao-hoangti, founder of the Han dynasty, one of the most illustrious that ever occupied the Chinese throne. Dynasty lasted 202 B.C.–226 A.D.

Chinese Empire. See CHINA.

Chinese-fire, a pyrotechnic composition, consisting of gunpowder, 16; niter, 8; charcoal, 3; sulphur, 3; cast-iron borings (small), 10.

Chinese Glue, a superior glue and varnish, obtained from a species of *Algæ* which abounds on the shores of China. When once dried it resists the action of water, and is used by the Chinese to fill up the lozenge-shaped interstices in the network of bamboos, of which their windows are frequently constructed, as well as to strengthen and varnish the paper of their lanterns.

Chinese Gordon. See GORDON, CHARLES GEORGE.

Chinese Grass, China Grass, Rhea or Ramie Fibre. See RAMIE.

Chinese Hemp. See CORCHORUS.

Chinese Immigration. Until the California gold discoveries of 1848 there were literally no Chinese laborers in the United States; nor was there then, or for years afterward, the least prejudice against their coming — the one objection to the Chinese being that they kept foreigners out of their own country, not that they infested others. From 1840 to 1850, according

to the records of immigration, only 35 came over, and those all in the year from June 1849 to June 1850. The treaties of 1844 and 1858 with China expressly aimed at securing a freer interchange both of commodities and citizens. The current "buncombe," even in California (the surest indication of public feeling, because its one aim is to please the unreflecting) was to proclaim America the asylum for the poor and oppressed without exception; and San Francisco business men welcomed the early Chinese comers, publicly fraternized with their traders, and made speeches of mutual compliment, with no objection from any source. During the next decade 1850–60, 41,397 Chinese came to the port of San Francisco, of whom about 6,500 returned to China, leaving the net Chinese population in 1860 34,933, nearly all in California. For some years the general feeling continued to be favorable, as labor was dear and domestic service almost impossible to obtain; and the Chinese laborer, and above all, the Chinese house servant, seemed to make industrial progress and lives of refined leisure possible. In the latter half of the decade some uneasiness began to be felt, but mainly from the belief that Chinese criminals were being deported here. The first restrictive legislation, not specifying Chinese, was to prohibit this. In 1855 an act was passed, said to have been aimed against the Chinese, fining any shipmaster $50 who landed passengers incapable of becoming citizens of California under its Constitution and laws, and ordering commissioners of immigration to obtain certificates of identity; but this, too, must have referred to criminals alone, for there was at this time no bar to Chinese citizenship. In 1858 the Reed Treaty was negotiated, after the Chinese war of that year, and no restriction was placed on immigration. In 1862 the California legislature appointed an investigating committee on the subject; but it was still felt to be only a local nuisance, not calling for any hasty or severe measures. Even as late as 1868 the Burlingame Treaty with China, though reprobating enforced immigration (coolies under contract), asserted the right of migration to be inherent in the human race; and on 27 July 1868, a special resolution of Congress, in response to anti-immigration measures in the East, repeated this assertion as to the right of human beings to expatriate themselves, and declared that its restriction was contrary to the fundamental principles of the republic. This meant European immigration, and caused a painful "straddle" in later political campaigns when California votes were needed; but it proves that even then the Chinese question had not become acute enough locally to force California politicians into making it a national touchstone. Within a few years after this, however, it was not only the burning issue of the Pacific Slope, but had emerged into the national arena. Bret Harte's 'Heathen Chinee' shows that "Chinese cheap labor" had become a popular local catchword; and the attempt of Eastern manufacturers about this time to use the Chinese for strike-breakers made the question of national notoriety.

This hostility was partly due to the Chinese as such — as extreme aliens with social and religious customs marking a permanent separation; but mainly to the special character of the immigration. Except a few merchants, it consisted almost wholly of the lowest class of coolies about Canton, and it was firmly believed that it was not voluntary and self-selected immigration, like that from Europe, but a system of exploited serfage — the coolies being collected in gangs by a Chinese corporation called the Six Companies, and shipped under rigid contract to work for a period of years under terms fixed by their masters. Their low standard of comfort was believed to affect the market and wage-rate for white labor unfavorably, and to build up great corporations without building up a corresponding class of civilized citizens; their sections of the cities were plague-spots of overcrowding and filth, besides being Alsatias where law did not run; they brought no wives, intending no permanent residence, and supplied the places of wives with hundreds of imported Chinese prostitutes; and their iron-barred opium joints, tempting not Chinese alone, were a still greater danger. Lastly, those who saw the excessive strain placed on democratic institutions by ignorant European immigrants, ultimately assimilable, were appalled at the prospect of operating them among a huge unassimilable and purchasable brute-vote on the Pacific Slope. If they were made voters, they would force a permanent political division on the lines of race; and if not, would form a dangerous anomaly and nuisance in the republic. Thus, white industry, order, sanitation, public morals, and statesman-like forecast united in the conviction that this class of immigration must be prohibited or severely restrained. These valid objections and fears were reinforced by others, unsound or exaggerated. The numbers arriving were vastly swollen in popular imagination, and the departures suppressed; except that when a point was made of their worthlessness to the country, it was asserted that all returned to China and so "drained the country" of their wages — which, if true, of course nullified the permanent danger from them, and involved an economic fallacy. The actual number of Chinese in the United States in 1870 was 62,376, an increase of some 27,000 in 10 years; 69,298 had come over within 10 years, and 34,850, or over one half, had gone back. But it was generally stated at 150,000 to 175,000; and the rate of increase at fully 25,000 a year. The population of China was estimated at 400,000,000 (pure guesswork), and it was assumed that the immigration represented a tendency diffused through this entire mass, who could and probably would pour 100,000,000 of its people into America in a short time, and swamp the European element utterly. As a matter of fact, the entire immigration came from within 40 miles of Canton, and the mass of Chinese will not emigrate, even to countries where they have full civil rights. It may be mentioned that in such places as Java and Hong Kong, they live and die with the same permanency as others; so that the argument which rests at once on the danger of their remaining and the financial loss of their not remaining must lose the latter clause. It was also asserted that there were more Chinese males in California than voters; but in fact they were under one sixth. But after all deductions, it was certain that the Chinese population in no long time would form a grave and apparently insoluble problem, a social and political menace, on the Pacific coast, and that the State could better afford a slower industrial growth, than a rapid

one based on a proletariat and a body almost equally dangerous as citizen or aliens.

After attempts at restriction by local legislation, which were invalidated by the federal courts as in violation of United States treaties, California appealed to Congress for a national law; but that body evaded the question till 1876. Then the exigencies of the Hayes-Tilden campaign compelled both parties to bid for California's electoral vote by anti-Chinese planks in their platforms; and Congress (the House, 6 July, the Senate 17 July), appointed a joint special committee to investigate the subject. It met at San Francisco 18 October, heard a mass of testimony, and made a very voluminous report, taking the strongest ground in favor of a restrictive law (Senate report 689, 44th Congress, second session, 27 Feb. 1877). At this time the Chinese population was about 100,000. Nevertheless, the party pledges were not redeemed in Congress till 1879, when on 20 March such a bill was passed; but it was vetoed by President Hayes as being in conflict with the Burlingame Treaty. In 1880 a commission was sent to Pekin to negotiate a new treaty permitting the restriction. This treaty, signed 17 Nov. 1880, ratified by the Senate in March 1881, gave the United States the power to "regulate, limit, or suspend" the immigration of new Chinese laborers, but not to prohibit it altogether; permitted laborers already in the country to remain and travel to and from it at will; and allowed Chinese merchants, students, teachers, or travelers, to exercise their functions without molestation, each class to have all the privileges and advantages of the most favored nation. (The Chinese population here in 1880 was 105,465.) Under guise of giving effect to this treaty, Congress, in March 1882, passed an act suspending Chinese immigration altogether for 20 years. This was vetoed by President Arthur on the ground that so long a suspension was virtually absolute prohibition, and not in accord with the spirit of the treaty. On 6 May another bill was passed to meet this objection, suspending fresh immigration for 10 years, both of skilled and unskilled laborers, permitting those already here to remain, but forbidding their naturalization. The provisions of this act were minutely severe. The exempted Chinese must have certificates of identity issued by the Chinese government and vised by the United States consul or diplomatic representative at the port of departure; departing Chinese laborers must take out return certificates, with heavy penalties for forgery or false personation; a master of a vessel who landed any unauthorized Chinese was subject to fine and imprisonment and the confiscation of his vessel; no Chinese passengers could be landed until the collector of the port had received the lists of the passengers and compared them with the persons, etc. The only Chinese laborers who could be permitted to return after once departing were those who had a living wife, parent, or child here, or $1,000 worth of property, which was made answerable for their default.

This was "amended" on 1 Oct. 1888 by the Scott Act, striking out all permission to return for any purpose, forbidding the issue of return certificates, and declaring all that were issued void,— in a word, absolutely barring America to any Chinese workman once outside it. A treaty was at this time pending between the United States and China by which the Chinese government was to prohibit the emigration of laborers, and the United States was to protect those in the country from violence, which it had shamefully failed to, but the Scott Act enraged the former government, and it refused to ratify the treaty. It may be mentioned that the supreme court in 1883, October term, decided that Congress can abrogate a treaty. On the expiration of the 1882 act in 1892, the "Geary law" of 5 May, extended it for another 10 years, with further severities, not called for by any dangers at hand; chief of these, that any Chinaman found in this country unlawfully should be imprisoned for a year at hard labor. On 3 Nov. 1893, on complaint that Chinese are so much alike to Western eyes that certificates of identification are not sufficient, an act was passed that each certificate must include the holder's photograph in duplicate. On 7 Dec. 1894, a convention with China restored the conditions of return to the status of 1882. On 3 March 1901, it was enacted that a Chinaman can only be arrested under these acts on sworn complaint of certain specified United States officers. In 1902 the exclusion was re-enacted for another decade. With the general intent of these acts, there is little difficulty in concurring; but some of the provisions, and the petty acridity of their execution, exhibit a spirit of panic which is neither dignified nor sensible. The volume of the immigration is the very essence of the danger; if it is insignificant it is harmless. Hence, the groundless harrying of innocent travelers or students, as if the mere presence of a single Chinaman constituted a grave national danger, is unmanly and irrational. The Chinese population in 1890 was 107,488; in 1900, 89,863 — a falling off of nearly 20,000 in 10 years. Consult: George F. Seward, 'Chinese Immigration' (1881); Mayo Smith, 'Emigration and Immigration' (1895); and the congressional report above cited.

Chinese Language, Literature and Writing. See CHINA.

Chinese Lantern, a lantern made of thin paper, usually variously colored and much used in illuminations.

Chinese Olive, the fruit of *Canarium commune*, order *Amyridaceæ*, a tree of the Asiatic archipelago yielding an oil which is used as a condiment and for lamps.

Chinese Pavilion, a semi-musical instrument composed of a pole with several transverse brass plates of some crescent or fantastic form, generally terminating at top with a conical pavilion or hat. On all these parts are hung small bells, which the performer causes to jingle by shaking the instrument held vertically up and down. It is employed only in military bands, and is more for show than use.

Chinese Swallows' Nests, curious productions, which sell at a high price in China, though they have no special points of recommendation beyond many other gelatinous ingredients in soups. They were formerly supposed to be made of some species of the rose-spored *Algæ*, as *Sphærococcus lichenoides;* but this is now ascertained to be a mistake, and it is known that they are formed of dried saliva from the mouth of the bird itself. The nests are the production of certain

species of swifts (not swallows) of the genus *Callocalia* which breed in caves on islands of the tropical Pacific and Indian oceans. All species of swifts secrete an abundant mucous saliva which is utilized along with other materials in constructing the nests; but species of *Callocalia* only form their nests of saliva exclusively.

Chinese Tartary, an old name of Eastern or Chinese Turkestan.

Chinese Terms. See CHINA.

Chinese White, a pigment prepared from the white oxide of zinc (ZnO), introduced into the arts in the latter part of the 18th century as a substitute for the preparations of white lead. Its color is not changed by exposure to the air.

Chinese Windlass, a differential windlass, in which the cord winds off one part of the barrel and on to the other, the amount of absolute lift being governed by the difference in the diameters of the respective portions. It is a good contrivance in the respect that great power may be attained without making the axle so small as to be too weak for its work.

Ching, Chinese prince: b. Peking about 1840. He is related to the Chinese imperial family and has held important civil and military posts, although he boasts that he has never been outside of Peking. He was at the head of the Tsung-li-Yamen, but was deposed in 1900 for his efforts to protect the legations in Peking, during which he attacked the Boxers (q.v.).

Ching-Hai, chĭng'-hī', or **Chin-Hai, China,** a seaport in the province of Che-Kiang, about 11 miles from Ningpo. Ching-Hai has no foreign commerce of its own, not being a treaty port; but is a resort for native traders from the Chusan Archipelago, and from here Chinese merchandise is sent to Ningpo. There is a missionary station and a native academy for students who compete in the civil service examinations at Ningpo. Pop. (1900) estimated 150,000, mostly Chinese.

Ching-Tu, chĭng-too', China, city, capital of the province of Sze-Chuen, situated on the Min River, 150 miles from its junction with the Yang-tse-Kiang, and 175 miles from the treaty port Chung-King. Ching-Tu is in one of the largest fertile plains of China, and is surrounded by mountains rich in the minerals of commerce. By way of the Min River and canals nearby, trade is carried on with the places in the valley of the Yang-tse-Kiang. The walls around the city are 12 miles in extent. The houses and streets indicate wealth. Telegraphic communications have been established with Hankow. It has an arsenal with modern equipment, and goods of European manufacture are found in some shops. Pop. about 9,000,000.

Chingleput, chĭng-glĕ-pŭt', or **Chengalpat,** or **The Jaghire,** India, a coast district in the province of Madras, area 2,842 square miles, surface rocky, water scarce, crops scanty. In the fertile localities grain and fruits are raised which are shipped to the Madras markets. Some manufacturing of cloth is carried on. The chief towns are Conjeveram, St. Thomas' Mount, Saidapet, Tiruvotiyur, and Chingleput. This tract of country was obtained in 1760 and 1763, by the East India Company, from the Nabob of Arcot. It was invaded by Hyder Ali in 1768, and again in 1780, when it was nearly depopulated by famine and emigration. Pop. 1,136,928.

Chingleput, or **Chingalpat,** India, town in the district of the same name, 15 miles west from the Bay of Bengal, 35 miles southwest of Madras, situated in a valley surrounded by hills. In 1751 it was taken by the French, retaken the following year by the British under Clive. A railroad enters the town. It has Roman Catholic and Protestant missions, hospital, jail, civil and criminal courts, and a dilapidated fortress which at one time was of considerable extent and well fortified. Pop. 7,000.

Chin'iot, India, town in the Jhang district of the Punjab, near the Chenab. It is famed for wood-carving, and has manufactures of coarse cloth. Its trade is also of considerable importance. Pop. 13,476.

Chiniquy, shē-nē-kē, **Charles Paschal Telesphore,** Canadian clergyman: b. Kamouraska, Que., 30 July 1809; d. Montreal 16 Jan. 1899. He was a Roman Catholic priest from 1833 to 1858, when he abandoned the Roman Catholic and joined the Canadian Presbyterian Church. He lectured in England in 1860, 1874, and 1882, and in Australia 1878–80. He wrote 'The Priest, the Woman, and the Confessional' (1874), a work that has had an enormous circulation in English-speaking countries, and has been translated into French, Italian, Spanish, and Dutch; 'Fifty Years in the Church of Rome' (1886; 5th ed. 1886); Papal Idolatry: Exposure of the Doctrine of Transubstantiation' (1887).

Chinkara, the common gazelle of India, sometimes called the "ravine deer." See GAZELLE.

Chinoline, kĭn'ō lĭn. See QUINOLINE.

Chinon, shē-nôn', France, an antique town in the department of Indre-et-Loire, beautifully situated on the Vienne, 31 miles southwest of Tours. Crowning a lofty rock are the ruins of its vast old castle, the French Windsor of the Plantagenets, the death-place of Henry II., and later the residence of several French sovereigns, where, in 1429, Joan of Arc revealed her mission to the Dauphin, A farmhouse across the Vienne is pointed out as Rabelais' birthplace. Pop. (1901) 4,200.

Chinook (chĭ-nŭk') **Wind,** a warm dry wind that often blows from the Rocky Mountains over the plains that stretch from their eastern base. The moisture-laden winds from the Pacific Ocean striking the lofty barriers of the Cascade and Rocky Mountains are forced to precipitate their moisture as rain and snow. When the ranges are crossed the winds are cold and dry. Descending the eastern slopes of the mountains the winds become warmer, because in descending the air is condensed, the atmospheric pressure at the base of the mountains being much greater than at the summit. The winds are, however, still dry, all their moisture having been precipitated in crossing the mountains. In the de-

Photograph by J. Horace McFarland Co.

CHINQUAPIN

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scent of 10,000 feet or so to the plains of Montana and the prairie province of Canada, the winds become so warmed by the increased pressure that they give a mild climate to regions far north. It is on account of these winds that cattle on the prairies of Alberta can graze in the fields all winter, a snowfall of a foot or more disappearing in a few hours before the warm, dry breath of the Chinook. Not all the warm winds of Montana and the regions north and south have their origin west of the Rockies. Various causes contribute to the formation of descending air, and when the descent is a number of thousands of feet, the winds resulting are always warm. Such winds blow over prairie regions west of the Missouri, but not always adjacent to the Rockies. Similar warm winds are known in other parts of the world, as in Switzerland, where they are called Föhn winds.

Chinooks, chĭ-nûks', a tribe of Indians, now nearly extinct, on the Columbia River, or in Oregon. Their language is very difficult to learn and to pronounce, and this led to the formation of the Chinook jargon, a trader's *lingua Franca,* consisting of words from French, English, and Hawaiian, as well as from Chinook and other Indian tongues.

Chinquapin, ching'kạ-pĭn, a dwarf chestnut (*Castanea pumila*), a native of South America, but growing wild in the Southern States as far north as Pennsylvania and westward as far as Texas. It is a shrub four or five feet high, but sometimes grows to the height of 30 or 40 feet.

Chins, a savage tribe living in the mountainous region between Lower Bengal and Upper Burma, of very primitive habits.

Chinsura, chĭn-soorā, British India, a town beautifully situated on the Hugli, and now included in the town of Hugli, 20 miles north of Calcutta. It is a military station, was formerly a Dutch settlement, and contains many neat houses in the Dutch style. It is celebrated for the manufacture of cheroots, and has several schools, among them some belonging to the Free Church of Scotland.

Chintreul, Antoine, äṅ twäṅ shäṅ-trėl, French landscape painter: b. Pont-de-Vaux, France, 15 May 1816; d. Septeuil 13 Aug. 1873. He was a pupil of Corot, obtained a medal at the Paris Exhibition, 1867, and that of the Legion of Honor in 1870. His sunlight effects have been greatly admired. The Luxembourg Gallery contains his 'Thicket With Deer' (1873).

Chintz, a cotton cloth gaily printed with designs of flowers, etc., in five or six different colors. It was a favorite in the time of Queen Anne, long before cotton prints became cheap. The name, being highly respectable, has since been applied to goods lacking the graceful and artistic character of the genuine article. The Chintzes of the Coromandel coast were celebrated in the time of Marco Polo, 13th century. They are mentioned also by Odoardo Barbosa, a Portuguese, who visited India soon after the passage of the Cape of Good Hope by Vasco de Gama: "Great quantities of cotton cloths admirably painted, also some white and some striped, are held in the highest estimation."

Chio, kē'ō. See CHIOS.

Chiob'be, a town in China, province Fokien, 15 miles southwest of Amoy. It is situated on a river bearing different names, navigable by junks of 400 tons, and is defended by a citadel and numerous other fortifications. It is the great emporium for common china-ware, and has important fisheries. The rearing of silk-worms forms an important occupation. Pop. estimated, 300,000.

Chiococca, kī-ō-kŏk'ạ, a genus of tropical plants of the natural order *Rubiaceæ,* consisting of small, often climbing, shrubs, with opposite stipulate leaves and bell-shaped or funnel-shaped, yellowish flowers in axillary clusters. The fruit is a white berry with two seeds. The bark of the root of *C. anguifuga* is a violent emetic and purgative. The root of *C. densifolia,* a woody bush, is considered a remedy for snake bites by the people of Brazil.

Chioggia, kē-ōd'-jä, or **Chiozza,** an important seaport town of northern Italy, 15 miles southwest of Venice, on an island at the southern end of the Venetian Lagoon, connected with the mainland by a stone bridge of 43 arches. It is founded on piles, has a beautiful cathedral; its harbor, the deepest in the lagoon, is guarded by forts and batteries. It is one of the strongest places in the Venetian lagoons. Many of the people are engaged in the coasting trade, lace-making, weaving, ship-building, and fishing. Pop. 25,100.

Chione, kī-ō'nē, the daughter of Dædalion, who was killed by Diana for boasting of her beauty.

Chios, kī'ŏs (now called by the natives *Chio,* Italianized into *Scio*), one of the most beautiful and fertile islands in the Ægean Sea, belonging to Turkey, seven miles off the coast of Asia Minor, at the entrance to the Gulf of Smyrna; about 30 miles long from north to south, by 8 to 15 miles broad, with a coastline of about 110 miles, an area of 320 square miles, and a population of about 70,000, almost all Greeks. The northern part is more mountainous than the southern part. The climate is delightful. Earthquakes are common, and one in 1881 caused the death of 3,558 persons, and the destruction of property to the value of over $15,000,000. The wine produced on the northwest coast, the *Vinum Arvisium* of ancient times, is still esteemed. Other products are figs, also noted in classical days; mastic, silk, lemons, oranges, and olives. Goats' skins are also exported. The capital, Chios, about the middle of the east coast, contains about 13,000 inhabitants, and has a harbor touched by various services of steamers, and doing a good trade. On the west coast is a rich monastery, Nea-Moni, founded in the 11th century. In ancient times excellent marble and potter's clay were quarried in the mountains, and recently pits of antimony and ochre have been worked.

Chios is one of the places which contended for the honor of giving birth to Homer. It formed in early times one of the most flourishing of the Ionian states, and contributed 100 ships to the Greek force defeated by the Persians in the sea-fight off Miletus (494 B.C.).

After the Persian victory the town and temples of Chios were burnt and many of the people enslaved. In more recent times the island was taken by the Genoese (1346), and by the Turks (1566), in whose hands it has since remained, except for a short interval. It was conferred as a private property on the sultana. After a long period of prosperity, Chios suffered a terrible blow during the war of Greek independence. A number of the Chiotes having in 1821 joined the revolted Samians, a Turkish fleet and army, in 1822, inflicted dreadful vengeance; 25,000 Chiotes fell by the sword, 47,000 were sold into slavery, and only some 5,000 escaped. A second rising in 1827 was likewise unsuccessful. The island has since been prospering.

Chip'man, Nathaniel, American jurist: b. Salisbury, Conn., 15 Nov. 1752; d. Middlebury, Vt., 15 Feb. 1843. He was an officer in the American army for a part of the Revolutionary War, and was admitted to the bar in 1779. He then removed to Tinmouth, Vt., where he commenced practice, and served as State's attorney for four years. In 1786 he was elected assistant judge of the supreme court, being the first lawyer who had been placed upon the bench in Vermont. In 1789 he was elected chief justice, and held that office until October 1791. In 1789 he was also appointed one of the commissioners to adjust the differences between Vermont and New York. In 1791 he was a member of the convention called to decide the question whether Vermont should accede to the Union. On 18 Jan. 1791 he was appointed a joint commissioner with Lewis R. Morris to attend Congress and negotiate for the admission of Vermont into the Union. In 1793 he published a small work entitled 'Sketches of the Principles of Government,' and a volume of 'Reports and Dissertations.' In 1796 he was again elected chief justice of the supreme court. In 1796 he was appointed one of a committee to revise a code of statute laws for Vermont, and the revised laws of 1797 were written by him. He was a United States senator in 1798–1803. In 1813 he was again elected chief justice of the supreme court, and continued in office two years. From 1816 to 1843 he was professor of law in Middlebury College. In 1833 he published 'Principles of Government: a Treatise on Free Institutions, Including the Constitution of the United States,' containing portions of his former treatise.

Chip'man, Ward, Canadian jurist: b. St. John, New Brunswick, 10 July 1787; d. there 26 Dec. 1851. He was the son of Ward Chipman (1754–1824), a Massachusetts loyalist who went to New Brunswick after the American Revolution. He graduated at Harvard in 1805, and succeeded his father as agent for the crown in determining the northwest angle of Nova Scotia. After holding minor legal offices he became puisne judge of the supreme court 1825, and chief justice of New Brunswick 1834, president of the legislative council, and speaker of the assembly.

Chip'munk, an American ground-squirrel, a small animal of the genus *Tamias,* about six inches long, with a slender furred tail, nearly as long as its body, and a coat of reddish-brown fur, striped with white on the back; from the marking it is called *Tamias striatus.* The eastern species has two white stripes, and the western chipmunk, *Tamias quadrivittatus,* which is exceedingly common all over the Rocky Mountain region, bears four stripes. The ground color also is extremely variable according to habitat. This little creature is often found frisking along stone walls, stopping now and again to sit erect and dart sharp glances at moving objects. It is generally shy in the presence of man, and escapes with great rapidity, when need arises, into some hiding-place. Its home is a burrow in some woodland place, tunnel-like in structure, sometimes fully 20 feet long, and always deep enough to be below the frost-line. It is enlarged into chambers at intervals. One of these, supplied with dried leaves, grass, and like material for bedding, is the sleeping apartment; the others are storehouses. In them the chipmunk stores his winter supplies of small nuts and acorns, especially the sweet beech-nuts. These he carries home, often several at a time, in his distensible cheek pouches. They are his chief food; but he will eat, also, buds, mushrooms, and insects. The breeding season is in May; and the young are usually from four to six in number. The chief enemies of the chipmunk are the fox and the weasel. The former is dangerous only in the open, as he is too large to disturb the chipmunk at home. But the weasel can attack him in his burrow; and, to escape him, the chipmunk makes an opening for possible escape, at the far end of his burrow. For consideration of the various species of *Tamias,* consult J. A. Allen, 'Bulletin of the American Museum of Natural History,' Vol. III.

Chippawa, chĭp'a wā, Canada, a village in the province of Ontario. It is situated at the confluence of the Chippawa and Niagara rivers, two miles above the Falls, and contains an extensive steam-engine manufactory, and one of the largest factories of stoves in the province. On 5 July 1814 the battle of Chippawa (q.v.) was fought here between the Americans and the British.

Chippawa, Battle of, 5 July 1814, an action in the War of 1812, remarkable for the defeat of a force of British regulars by an inferior number of Americans, in pitched battle on an open plain, without advantage of position, and with weaker artillery. Maj.-Gen. Riall, commanding the British forces, had about 1,500 line infantry — the King's regiment, the 100th, and the Royal Scots, with dragoons and artillerymen, and 600 skirmishers — north of the Chippawa River, which enters Niagara on the Canada side just above the rapids; the bridge from Chippawa village crossed it near its mouth. Joseph Brown's American force lay to the south beyond Streeter's Creek, and Brown started on the morning of the 5th to build another bridge across the Chippawa, to outflank Riall, whose skirmishers crossed the river and harassed the work and the camp from the woods on the west, and Peter B. Porter's militia brigade was sent to drive them out. As it approached the river, Riall's army

crossed the bridge on its right flank, and it fled in panic, about 5 P.M. Riall thereupon deployed his force and advanced on the plain toward Brown. Scott's brigade of 1,300 was about crossing the creek bridge for a Fourth of July parade and, the creek being lined with woods, only learned of the danger at the last moment. Each side had three guns; but the British were two 24's and a 5½-inch howitzer, against the American three 12's. Scott's troops crossed the bridge under fire from the 24's, and coolly deployed beyond; while Scott threw his wings forward to avoid being outflanked, the left wing reaching into the woods. Both sides advanced, with pauses to load and fire, till the flanks touched and the centres were 200 feet off; when the British, unable to endure the deadly musket-fire in front and the artillery now sweeping diagonally through the ranks, broke and ran for the Chippawa. The battle lasted less than an hour; and when Ripley's brigade came to Scott's help the plain was deserted by the enemy. Riall lost 137 killed and 305 wounded of the regulars, nearly a third of his entire force, besides 73 skirmishers; Scott, 48 killed and 227 wounded; and Porter, 22 more. The victory was won by superior musketry and artillery fire, as shown by the enormous disparity in killed; and by a leader under whom every private was a hero. Consult Henry Adams, 'History of the United States,' Vol. VIII., ch. 2.

Chip'pendale, Thomas, English cabinet-maker. He is supposed to have gone to London from Worcestershire before 1750. The style of furniture named from him was less heavy and severe than that of his successors, and was elaborate, delicate, and baroque, with classical tendencies. He wrote a 'Cabinet-maker's Director' (1752).

Chip'penham, England, a municipal borough of Wiltshire, 12½ miles northeast of Bath, on the Avon, here crossed by an ancient stone bridge of 22 arches. It consists of one principal street, with others diverging from it. It contains two large parish churches with lofty spires, an old and a new town-hall, etc. The station of the Great Western Railway here is a very large one. The town is an important mart for cheese, and contains a woolen factory, a silk factory, large condensed-milk factory, railway works, boot factories, etc. Pop. (1901) 5,074.

Chippewa, chĭp'pē-wä. 1. Michigan, an eastern county of the upper peninsula, bordering on lakes Superior and Huron, and bounded east by the river St. Mary. The surface is hilly and partly covered with forests of pine. Capital, Sault Ste. Marie. 2. Wisconsin, a county bordering on the Mississippi River, traversed by the Chippewa and several affluents; area, about 4,300 square miles. Sandstone is abundant, and much of the surface is well wooded. Capital, Chippewa Falls.

Chippewa, a river of Wisconsin, which has its rise in the north of the State, and after receiving several tributaries flows southwest into Lake Pepin, an expansion of the Mississippi.

Chippewa Falls, Wis., town and county-seat of Chippewa County. It is on the Chippewa River, and the Chicago, M. & St. P., the Chicago, St. P., Minneapolis & O., and the Wisconsin Cent. R.R.'s; 12 miles northeast of Eau Claire. It contains the County Insane Asylum, the State Home for the Feeble-Minded, and has important manufactures, large water power from the river, electric lights, and street railways, daily and weekly newspapers, two national banks, and an assessed property valuation of $2,000,000. Pop. (1900) 8,094.

Chippeways, chĭp'pē-wāz, or **Ojibways,** a tribe of North American Indians in the United States and Canada. They are distributed in bands round both sides of the basin of Lake Superior, where they once owned vast tracts. They are of the Algonquin stock, tall, active, and well formed, subsist chiefly by hunting and fishing, and number about 18,000.

Chip'ping Spar'row (*Spizella socialis*), a common North American migratory bird allied to the chaffinch, some five or six inches long, whose song consists of about half a dozen notes uttered in quick succession. It is also called chipping bird, and chippy. It is also known as the hair-bird from its habit of lining its nest with horse-hair. In the nest, which is built in low trees or shrubs, are laid four or five blue eggs slightly speckled with brown. Two or three broods are raised during the season. The bird is naturally an eater of seeds, and has sometimes been known to destroy insects, but the evidence in favor of the contention that it is the friend of the farmer and gardener is hardly enough to warrant the encomiums of some writers.

Chips from a German Workshop, by F. Max Müller (5 vols). A collection of special studies incidental to the author's editing of a library of the 'Sacred Books of the East.' The several volumes cover various fields, as follows: (1) 'The Science of Religion'; (2) 'Mythology, Traditions, and Customs'; (3) 'Literature, Biography, and Antiquities'; (4) 'Chiefly the Science of Language'; (5) 'Miscellaneous' and later topics. Although they are the result of «occasional work,» their wealth of material and thoroughness of treatment, and the importance of the views presented, give them not only interest but permanent value. On many of the points treated, discussion is still open, and some of the views advanced by Prof. Müller may come into doubt; but his contributions to a great study will not soon lose their value.

Chiquichiqui (chē'kē-chē'kē) **Palm,** a native of Brazil, where it is called piassaba. It grows in swamps and along low river banks. Its leaves are used for thatching, and it is the source of a fibre which is used for making brushes.

Chiquimula, chē-kē-moo'lä, Guatemala, Central America, a small town in the east of Guatemala, 55 miles northeast of the city of New Guatemala. It is in a mountainous region, valuable mineral deposits near, and a delightful climate. Pop. 6,500.

Chiquinquira, chē-kēn-kē-rä', Colombia, South America, the largest town in the department of Boyacá, near the Suarez, 42 miles west of Tunja; was an Indian place of pilgrimage before the conquest. In one of the churches is a miraculous picture of the Virgin. Where it is preserved is now visited annually by some 60,000 pilgrims. Pop. 12,800.

Chiquitos, chē-kē'tōz, a race or stem of Indians inhabiting western Bolivia. The chief occupation of the people when first discovered by the whites, was agriculture. They rejected Spanish rule and European customs until 1691, when the Jesuits established a mission among them. The soil here is rich, growing vanilla, indigo, cotton, sugar, etc.; but for want of markets there is little cultivation. The policy of the Jesuit missionaries has made the Chiquito language the predominant one among the natives. It is copious, and is said to have a separate vocabulary for female use. The size and decorations of the churches, and the perfection of the church music in which the natives take a part, are a curious monument of the perseverance of the Jesuit missionaries, which has succeeded in implanting in the midst of these solitudes a fragment of European civilization. In the year 1767 the Jesuits were expelled from the place, by Spanish authority. Since then the Chiquitos have not prospered, and their numbers have decreased. They still cultivate the soil, which is fertile, growing vanilla, indigo, cotton, sugar, etc.; but for want of markets there is little ambition to raise large crops. The native population is about 22,000, distributed among 10 missions.

Chiragra, kī'răg-ra, that species of gout which attacks the joints of the hand (the wrist and knuckles) and hinders their motions. It gradually bends, distorts, and finally stiffens the fingers.

Chirata, chĭ-rä'ta, or **Chiretta,** *Ophelia Chirata,* a slender branching annual of the gentian family, two to three feet high, with yellow flowers. It is a native of India, where the dried stems are in repute as a tonic and febrifuge both with native and European practitioners.

Chiretta, chĭ-rĕt'ta. See CHIRATA.

Chiriqui, chē-rē-kē', Panama, formerly one of the administrative divisions of Colombia, adjoining Costa Rica; area, 6,500 square miles. It is well wooded, and has rich pasturage, especially on the Atlantic coast, where the climate is very moist. The Cordilleras that occupy the interior reach their highest point in the volcano of Chiriqui (11,265 feet). Chief town, David. On the north coast is a spacious lagoon with a depth of water for the largest ships. Pop. 45,000.

Chirogale, kī'rō-gāl, or MOUSE-LEMUR, a small lemur of the genus *Chirogale,* native exclusively to Madagascar, especially *C. Coquereli.* It lives in trees and at the approach of the dry season curls up in a hollow place in a tree and sleeps until the rainless time is over. Like hibernating animals of cold regions, it accumulates a large deposit of fat before becoming torpid; and when it wakes it has regained its normal condition. It feeds on fruits and insects, and builds a nest somewhat like a bird's. Four other species are known whose habits are similar, generally, to those of the lemurs (q.v.), especially the galagos, to which they are closely allied.

Chiromancy, kī'rō-măn-sĭ. See PALMISTRY.

Chiron, kī'rŏn, in Greek mythology, the son of Kronos (Saturn) and Philyra. Kronos assumed the shape of a horse, in this amour, to deceive his wife, Rhea. The shape of Chiron, therefore, was half that of a man, half that of a horse. In point of fact, Chiron was one of the people called *Centaurs.* He was celebrated through all Greece for his wisdom and acquirements; and the greatest princes and heroes of the time were represented as his pupils. He was particularly skilled in surgery. When Hercules drove the Centaurs from Mount Pelion, they took refuge with Chiron in Malea; but their enemy pursued them even into this retreat, and unfortunately wounded his old teacher with a misdirected arrow. The speedy operation of the poison in which the arrow had been dipped rendered remedies useless; and Chiron suffered the severest torments. The gods at his prayer put an end to his life, though his nature was immortal by reason of his descent from Kronos. After his death he was placed among the stars, and became the constellation Sagittarius.

Chirop'tera. See CHEIROPTERA.

Chiru, chĭ'roo, a large antelope (*Pantholops hodgsoni*) native to the plateau of Tibet, especially in pine forests. It is about 32 inches tall, and pale in color. The buck has a black face, and long horns like those of the gazelle. It is wary to a degree that makes the autumnal hunts of the natives a matter of patience as well as of skill. This fine antelope is related to the saiga of Eastern Russia.

Chisel, an edged tool for cutting wood, iron, or stone. It is operated by striking its upper end with a hammer or mallet, or by pressure. It is one of the most ancient of tools. Chisels of sharp flint have always been used by savages to cut wood, and in very early times bronze ones were made which would cut the hardest stone. The ancient Egyptians carved most of their granite monuments with copper or bronze chisels, which are said to have cut as well as the best steel chisels of the present day. Chisels are now made in many different forms and for many kinds of work. Those used by sculptors, masons, and other workers in stone are merely short pieces of steel with sharp edges. The tool is held in the left hand and is made to cut by striking it on the end with a broad hammer called a mallet, made usually of wood. Blacksmiths, and other iron-workers use chisels much like those of stone-cutters, for cutting off bars of iron and like work. Carpenters and joiners' chisels are much finer tools, and usually have handles. They are made out of bar iron by forging, or hammering it while hot, and the edge of tool steel, is put in in the same way as the edge of an axe. Such chisels are made of many sizes, from an eighth of an inch up to several inches in width, and are used for different kinds of wood-cutting and -carving. Dovetails, mortises, and other such work are usually cut with chisels. A kind of chisel with a rounded blade, used for cutting grooves and round places in wood, is called a gouge.

Chis'elmouth. See CHUB.

Chisholm, chĭz'ŭm, MRS. **Caroline** (JONES), English philanthropist: b. Wootton, North-

amptonshire, 1808; d. 1877. In her 20th year she married an officer of the Indian army, with whom she proceeded to Madras. Prompted by the destitute condition of the orphans of British soldiers, she established and managed there, with happy results, a school for girls and a school of industry. In 1838 she removed with Capt. Chisholm to Australia, and at Sydney she found a new call upon her exertions in the numerous young women landed there in destitution from emigrant ships. Between 1841 and 1845, she procured employment for 11,000 persons, to whom she had lent in small sums £1,200, the whole of which, excepting £16, was repaid to her. She visited England in 1846; instituted the family colonization society, by which passage money was paid in weekly instalments; and in many ways planned to relieve emigrants of the poorer classes. She returned with her family to Australia in 1854.

Chisholm, William Wallace, American official: b. Morgan County, Ga., 6 Dec. 1830; d. De Kalb, Miss., 13 May 1877. In 1847 his family removed to Kemper County, Miss., and between 1858 and 1867 he was a justice of the peace and probate judge. During the Civil War he was a union man, but was continued in office, although regarded with suspicion by the Confederate authorities. After the war, a fusion of white unionists and negroes elected him sheriff. In 1877 a long standing personal and political feud between Chisholm and an opposing faction, led by John W. Gully, came to a head. On April 26 Gully was waylaid and murdered. His friends accused Chisholm and his party of being instrumental in bringing about the crime. Chisholm and four others were arrested on the morning of April 29; a mob entered the village and insisted that Chisholm, who was in his own house in the custody of the sheriff, should be lodged in the jail. His wife, daughter, and son accompanied him there; the jail was shortly after attacked by the mob; Chisholm and his daughter receiving wounds that later proved fatal, while the son was killed in his father's arms by a shot from one of the leaders of the assailants. One of the other prisoners, Gilmer, had previously been killed by the mob. In December, 1877, Walter Riley, a negro, confessed that he had murdered Gully, and denied any knowledge or complicity on the part of Judge Chisholm or the latter's associates. See Wells' 'Chisholm Massacre' (1878). 'Kemper County Vindicated' gives the Democratic side of the affair.

Chisholm v. Georgia, in the United States supreme court, the case which led the several States to protect themselves from legal responsibility to individuals, while retaining legal powers of aggression. The Constitution provides (Art. iii., sec. 2): "The judicial power shall extend to all cases — between a State and citizens of another State." Under this provision Maryland was sued soon after the adoption of the Constitution, and acknowledged process by her attorney-general; but the case was compromised, and the question of jurisdiction did not come up. On 11 July 1792, Alexander Chisholm of South Carolina, as legatee in an inheritance case, served a process on the governor and attorney-general of Georgia to appear before the August term of the supreme court. Georgia instructed its attorney-general not to appear, and its counsel to enter a denial that States could be sued by individuals, or that the supreme court had jurisdiction in such cases, but not to argue the case. Chief Justice Jay, and all the court except Iredell of North Carolina, found that the court had such jurisdiction; and a writ of inquiry was issued, but not served because Georgia passed an act making service of it a capital offense. Virginia was as angry as Georgia; and the Eleventh Amendment to the Constitution was introduced into Congress, passed by two thirds of both Houses, 5 March 1794, ratified by the States, and declared in force, 8 Jan. 1798. It reads: "The judicial power of the United States shall not be construed to extend to any suit in law or equity, commenced or prosecuted against one of the United States by citizens of another State, or by citizens or subjects of any foreign state." This leaves the constitutional provision hanging in the air, unless construed as meaning "between a State *as plaintiff* and citizens of another State"; and thus the southern Confederacy made the corresponding article of its constitution read.

Chislehurst, chĭz'ĕl-hẽrst, England, a village in west Kent, with an ancient parish church, two district churches, Roman Catholic church, etc. The mansion of Camden Place was occupied from 1871 by Napoleon III, and the Empress Eugénie, and the former died there in 1873. There is a Runic cross in memory of the Prince Imperial. The remains of Napoleon III. and his son were removed from there to Farnborough in 1888. Pop. (1901) 7,429.

Chisleu, kĭs-loo, or **Kislev,** the ninth month of the Jewish year, commencing with the new moon in December or the latter part of November. See KISLEV.

Chiswick, chĭs'ĭk, England, a town and parish of Middlesex, six miles west of Hyde Park Corner, London. It has an ancient church, with Hogarth's tomb in the churchyard, and several schools, contains the gardens of the Royal Horticultural Society, and Chiswick House, in which Fox and Canning died. There are engineering works, breweries, market-gardens, etc. Pop. (1901) 29,809.

Chitaldrug, chĭt-ŭl'droog', or **Chitteldroog** (native, *Sitala Durga,* spotted castle), India, a town and fortress, capital of a district of the same name in the Nagar division of Mysore. The town is 126 miles northwest of Bangalore, and the fortress, occupying a cluster of rocky hills about 800 feet high, consists of a labyrinth of fortifications winding irregularly up from rock to rock to the summit, and guarding every accessible point. Inside the fortifications are a number of temples. The modern town stands at the northeastern base of the hills. Pop. 5,000.

Chitin, or **Chitine,** kī'-tin ($C_{15}H_{26}N_2O_{10}$), the horny substance which gives firmness to the tegumentary system and other parts of the *Crustacea, Arachnida* and insects; probably also the carapace of the *Rotatoria* consists of it. It is left when the above structures are exhausted successively with alcohol, ether, water, acetic acid, and alkalies. It is colorless and amorphous,

and is usually classed a proteid. It is dissolved by concentrated mineral acids without the production of color. It is not dissolved by solution of potash, even when boiling; neither does it give the characteristic reactions with Milton's or Schultze's tests.

Chiton, kī'tŏn, a genus of *Mollusca* and the common name of the same, the shells of which are boat-shaped, and consist of a median series of symmetrical plates, folding over each other, and implanted in the mantle, the marginal zone of which is studded with spicules. It is the typical genus of the family *Chitonidæ* of the class *Amphineura.*

This class is remarkable among the *Mollusca* in having certain of the organs distinctly segmented. The body is sole-shaped, symmetrical, and without distinct head or tentacles, but with a lateral fringe of gills. No eyes corresponding to those of snails are present, but very numerous eyes are scattered all over the back. The alimentary canal is much like that of a snail, being much convoluted, and provided at the anterior end with a muscular tongue and toothed radula. On the other hand the nervous system is unique in consisting of two pairs of longitudinal ganglionated cords, one of which, the pedal pair, is provided with transverse connective at intervals.

The chitons cling firmly to rocks, etc., by means of the powerful foot, many of them resisting the heaviest beat of the surf. Only very small species (*Chætapleura,* etc.) are found on the eastern Atlantic coast, but larger species occur in Florida and the Gulf of Mexico, while California has the giants of eight or ten inches of the genus *Cryptochiton.* Consult Hubrecht, 'Quarterly Journal of Microscopical Science,' 1882.

Chiton, kī'tŏn, the undergarment of the ancient Greeks. In the earliest times it was worn by the men only; in later times there were two forms, and the chiton was worn by both sexes. The Dorian chiton was sleeveless, reaching about to the knees, and usually left more or less open on the right side. The Ionian was a long tunic reaching to the feet, closed on the sides, sometimes sleeveless, but often with short or long sleeves. Both forms were usually worn belted in at the waist.

Chit'or, or **Chittore,** India, a town and fort of Hindustan, in the native state of Oodeypore, Rajputana, on the Gamneri River, about 70 miles northeast of the town of Oodeypore. The town was for several centuries capital of Oodeypore, and was far more prosperous and wealthy than it is at present. It still contains many temples and other well-constructed buildings. The fort, formerly considered one of the strongest in India, stands upon a high rock overlooking the town. Pop. 11,000.

Chitra. See AXIS-DEER.

Chitral, chĭt-räl', British India, a native state, having Yasin and Gilgit on the east, Swat, Dir, and Bajaur on the south, Kafiristan on the southwest, and the Hindu Kush mountains on the north and northwest. Through it flows in a southwest direction the Chitral or Kunar or Kashkar River, a tributary of the Kabul, and on it, in about lat. 36° N., stands the town of Chitral at a height of more than 5,000 feet above sea-level. The people are Moslems, but mostly speak a language closely akin to that of their pagan neighbors in Kafiristan. Upper Chitral, with its capital Mastuj, is closely connected with Gilgit. Lower Chitral enjoyed till recent times undisturbed independence; but in 1894 an English resident and small body of troops were surrounded and besieged in Chitral, the consequence of which was that in March 1895 an expedition was sent (the main body by the Swat valley, the other from Gilgit), which after some sharp fighting advanced triumphantly through extremely difficult country, relieved the besieged, and annihilated all opposition.

Chittagong, chĭt-ta-gŏng', India, district in the presidency of Bengal, Hindustan. The district has Tipperah on the north, the Chittagong Hill Tracts on the east, Arracan on the south, and the Bay of Bengal on the west. Its area is 2,563 square miles, and it has a population of about 1,300,000. The Blue Mountains, on the northeast, attain a height of 5,600 feet. The principal river is the Karnaphuli, or Chittagong. The level lands, chiefly on the coast, and the valleys are very fertile. The principal exports are timber, canvas, coarse cloths, and elephants. A considerable majority of the inhabitants are Mohammedans. The city of Chittagong, the capital of the district, is situated on the right bank of the Karnaphuli, 12 miles from its mouth and 220 miles east of Calcutta, and is the second port of Bengal. It consists of a series of detached houses on little hills. Although its climate is unhealthful, it is an important industrial and trade centre, among its exports being rice, jute, jute manufactures, and tea. Pop. 25,000.

Chittagong Wood, the wood of several Indian trees, especially of *Chickrassia tabularis.* It is a light-colored beautifully grained wood used by cabinet-makers. It is light in weight but does not wear well in changeable climates, as it warps in dry weather. The wood of *Cedrela Toona* receives the same name.

Chit'tam-wood, or **American Smoke-tree** (*Continus cotinoides*), belongs to the sumac family. It is a small tree with wide spreading branches growing to the height of about 40 feet. It flourishes during the months of April and May in Tennessee and Alabama and westward to Missouri and Indian Territory. A rich dye for commercial use is extracted from the orange-yellow wood, which weighs about 40 pounds to the cubic foot.

Chit'tenden, Hiram Martin, American military engineeer: b. New York 25 Oct. 1858. He has supervised engineering government works in the Yellowstone National Park and elsewhere, and has published 'The Yellowstone National Park: Historical and Descriptive' (1893); 'Reservoirs in the Arid Regions' (1897); 'Reservoir System of the Great Lakes' (1898); 'The American Fur Trade of the Far West' (1901).

Chittenden, Russel Henry, American educator: b. New Haven, Conn., 18 Feb. 1856. He was graduated at Yale in 1875, and took a course at Heidelberg. He became professor of physiological chemistry at Yale in 1882, and since 1896 has been director of the Sheffield Scientific School. He has written 'Digestive Proteolysis'; 'Studies in Physiological Chemistry,' and similar works.

Chittenden, Thomas, American colonial and State governor: b. East Guilford, Conn., 6 Jan. 1730; d. Williston, Vt., 24 Aug. 1797. He was one of the pioneers of Vermont, settling upon the New Hampshire grants in 1774, and acquiring a fortune from his lands. In 1778 he became Governor of Vermont, before its formal separation from New York was recognized. During the Revolutionary War the English and the Continental Congress receiver overtures from him, his terms being recognition of Vermont's statehood. He retired from public life in 1796.

Chittim. See KITTIM.

Chittoor, chit-toor', or **Chittur,** India, a town, capital of North Arcot district, Madras. It contains courts and public offices, an English church and a Roman Catholic chapel. Pop. 10,000. There is a town of the same name in the state of Cochin, Madras, with about the same population.

Chit'ty, Joseph, English lawyer and legal writer: b. 1776; d. London 17 Feb. 1841. He acquired great reputation by his legal text-books. These comprise a 'Treatise on Bills of Exchange' (1799); 'Treatise on the Parties to Actions and to Pleadings' (1808); 'Treatise on the Law of Nations Relative to the Legal Effects of War on the Commerce of Belligerents and Neutrals' (1812); 'A Practical Treatise on the Criminal Law, Adapted to the Use of the Profession, Magistrates, and Private Gentlemen' (1816); 'Treatise on Commercial Law' (1818); 'Collection of the Statutes of Practical Utility' (1829-37); 'Treatise on Medical Jurisprudence' (1834).

Chiusi, kē-oo'sä, Italy, a town in the province of Sienna, 102 miles north-northwest of Rome, on an olive-clad eminence in the Val di Chiana, not far from the small Lago di Chiusi. In ancient times, under the name of Clusium, it was one of the 12 republics of Etruria, and the residence of Porsenna. When Italy was overrun by the barbarians, it fell into decay, the whole valley was depopulated, and became the pestilential pool described by Dante. Since the improvement of the course of the Chiana, Chiusi has begun to flourish again along with the whole district. It is in connection with the discovery of Etruscan antiquities, however, that the place is chiefly heard of. During the 19th century immense quantities of these remains were found in the neighborhood in the grottoes that served the ancient Etruscans as tombs. They consist chiefly of sun-dried black earthenware vases, ornaments, relievos, and carved stonework, and are preserved in the museums at Chiusi and Florence.

Chiv'alry (Fr. *chevalerie,* from *cheval,* Lat. *caballus,* "a horse"), a term which indicates strictly the organization of knighthood as it existed in the Middle Ages, and in a general sense the spirit and aims which distinguished the knights of those times. The chief characteristics of the chivalric ages were a warlike spirit, a lofty devotion to the female sex, a love of adventure, and a thirst for glory.

To explain the nature and origin of chivalry we must consider the character of the ancient German tribes. The warlike spirit was common to them with other barbarous nations; but there were certain traits in their character peculiarly their own. Among these was their esteem for women. This is dwelt upon by Tacitus, and is sufficiently apparent from the early native German historians. This regard for the female sex was diffused by them through every country into which they spread, though with considerable difference in the forms in which it developed itself. In France it became that refined gallantry for which the nation has been so long conspicuous; in Spain it assumed a more romantic and glowing character, displaying much of the fire of Oriental feeling; in Germany itself it became faithful and tender attachment to the wedded wife. Engrafted upon this primitive regard for woman amongst the Germanic tribes, the moral and æsthetic principles of the Christian Religion, its ideals of chastity, marriage and loyalty, and in particular the widespread veneration paid to the Virgin Mother of Christ, powerfully contributed to the development of the institutions of chivalry. We may be told, in answer to our claim of the peculiar regard for the female as a characteristic of the Teutonic tribes, that women were held in high esteem by the Romans. It is true that wives and mothers were treated with great regard by the Romans, and the history of no nation affords more numerous instances of female nobleness; but this esteem was rendered to them, not as females, but as the faithful companions and patriotic mothers of citizens. It had somewhat of a political cast. But this was not the case with the Germans. There is another trait of the German character which deserves to be considered in this connection, which is very apparent in their literature, and the lives of many individuals; we mean that indefinite thirst for something superior to the realities of life, that *sehnen,* to use their own word, which hardly admits of translation, which has produced among them at the same time so much excellence and so much extravagance. These three traits of the Teutonic race, their warlike spirit, their esteem for women, and their indefinable thirst for superhuman greatness, together with the influence of the feudal system and of the Roman Catholic religion, afford an explanation of the spirit of chivalry — an institution which, to many observers, appears like an isolated phenomenon in history, and leaves them in doubt whether to despise it as foolish or admire it as sublime. The feudal system divided the Christian Teutonic tribes into masses, the members of which were united, indeed, by some political ties, but had little of that intimate connection which bound men together in the communities of antiquity, and which has produced like effects in our own and a few preceding ages. They still preserved, in a great measure, the independence of barbarians. There was, however, one strong bond of union which gave consistency to the whole aggregate; we mean the Roman Catholic religion. The influence of a common religion was of great service to mankind, during the ages of turbulence and violence, in giving coherency to the links of the social chain, which were continually in danger of parting. To this cause is to be ascribed the great uniformity of character which prevailed during the ages of chivalry. The feudal system, besides, enabled the gentry to live on the labors of the oppressed peasants without the necessity of providing for their own support, and to indulge the love of adventure incident to their warlike and ambitious

character. If we now combine the characteristics which we have been considering — a warlike spirit, a lofty devotion to the female sex, an undefinable thirst for glory, connected with feudal independence, elevation above the drudgery of daily toil, and a uniformity of character and purpose, inspired by the influence of a common religion — we obtain a tolerable view of the chivalric character. This character had not yet quite developed itself in the age of Charlemagne. The courage exhibited by the warriors of his age was rather the courage of individuals in bodies. The independence, the individuality of character, which distinguished the errant knight who sought far and wide for adventures to be achieved by his single arm, was the growth of a later period. The use of the war-horse, which formed so essential an instrument of the son of chivalry, was not common among the Germans until the time of their wars with the Huns. They were, indeed, acquainted with it before, and Tacitus mentions it in his account of Germany; but it was not in common use among them till the period we have mentioned. After it was introduced, cavalry was considered among them, as among all nations in the early stages of their progress, much superior to infantry, which was, in fact, despised, until the successes of the Swiss demonstrated its superiority. In the 11th century knighthood had become an established and well-defined institution; but it was not till the 14th that its honors were confined exclusively to the nobility. The Crusades gave a more religious turn to the spirit of chivalry, and made the knights of all Christian nations known to each other, so that a great uniformity is thenceforward to be perceived among them throughout Europe. Then arose the religious orders of knights, the knights of St. John, the Templars, the Teutonic knights, etc. The whole establishment of knighthood assumed continually a more formal character, and, degenerating, like every human institution, sank at last into quixotic extravagances, or frittered away its spirit amid the forms and punctilios springing from the pride and the distinctions of the privileged orders of society. It merged, in fact, among the abuses which it has been one of the great labors of our age to overthrow. The decline of chivalry might be traced through the different forms which it assumed in different nations as distinctly as its development — a task too extensive for this work.

The education of a knight was briefly as follows: The young and noble stripling, generally about his 12th year, was sent to the court of some baron or noble knight, where he spent his time chiefly in attending on the ladies and acquiring skill in the use of arms, in riding, etc. This duty of waiting about the persons of the ladies became, in the sequel, as injurious to the morals of the page as it may have been salutary in the beginning. When advancing age and experience in the use of arms had qualified the page for war, he became an *escuyer* (esquire or squire). This word is generally supposed to be derived from *escu* or *scudo* (shield, *scutum*), because among other offices it was the squire's business to carry the shield of the knight whom he served. The third and highest rank of chivalry was that of knighthood, which was not conferred before the 21st year, except in the case of distinguished birth or great achievements. The individual prepared himself by confessing, fasting, etc.; religious rites were performed; and then, after promising to be faithful, to protect ladies and orphans, never to lie or utter slander, to live in harmony with his equals, etc. (in France there were 20 vows of knighthood), he received the *accolade,* a slight blow on the neck with the flat of the sword from the person who dubbed him knight, who at the same time pronounced a formula to this effect: "I dub thee knight, in the name of God and St. Michael (or in the name of the Father, Son, and Holy Ghost). Be faithful, bold, and fortunate." This was often done on the eve of battle, to stimulate the new knight to deeds of valor, or after the combat, to reward signal bravery.

Though no man of any reflection would wish for the return of the age of chivalry, yet we must remember that chivalry exercised, in many respects, a salutary influence at a time when governments were unsettled and laws little regarded. Though chivalry often carried the feelings of love and honor to a fanatical excess, yet the reverence paid to them contributed to prevent mankind, at this period of lawless violence, from relapsing into barbarism; and as the feudal system was unavoidable, it is well that its evils were somewhat alleviated by the spirit of chivalry. The influence which chivalry had on poetry was very great. The *troubadours* in the south of France, the *trouvères* in the north of the same country, the "minstrels" in Great Britain, the *minnesinger* in Germany, sang the achievements of the knights who received them hospitably. In Provence arose the "Courts of Love," which decided the poetical contests of the knights. At these, amorous songs (*chansons*), duets (*tensons*), pastoral songs (*pastourelles*), and poetical colloquies (*sirventes*), were performed. In Germany the chivalric spirit produced one of the most noble epics, the 'Nibelungenlied' (q.v.). It was the spirit of chivalry which led to the Crusades, and from the intercourse with the East which grew up during this period the wonders of Oriental enchantment were introduced into the romantic or chivalric poetry, and European literature received a great stimulus. Chivalric poetry, however, existed apart from any influence of this kind, and really begins with the mythological cyclus of King Arthur's round table and the feats of his knights, which furnished materials that found poetic treatment in various European countries. A second cyclus is that of Charlemagne and his paladins, his 12 peers, which remained a poetical foundation of chivalric poetry for many centuries. Alexander the Great also became a great hero of chivalric poetry. The cyclus of Amadis, which belongs, perhaps, exclusively to Spain, does not rest on any historical ground. For further information see the essay on chivalry, originally in the 'Encyclopædia Britannica,' written by Sir Walter Scott; Heeren's 'Essay on the Influence of the Crusades'; 'Mémoires sur l'Ancienne Chevalerie, par Lacurne de Sainte-Palaye' (2 vols., with engravings); Gautier's 'La Chevalerie'; Henne am Rhyn's 'Geschichte des Rittertums'; and 'Don Quixote.' See also DUELLING; MIDDLE AGES; TOURNAMENT.

Chivasso, kē-väs'sō, Italy, a town on the Po, 14 miles northeast of Turin. It was formerly strongly fortified, and contained the residence of the dukes of Montferrat. Pop. 10,000.

Chive, or **Cive,** a perennial herb (*Allium Schœnoprasum*), of the natural order *Liliaceæ*. It is a native of Europe, Asia, and the northern parts of North America, but has been introduced in temperate climates as a vegetable. It has small, flat, clustered bulbs which multiply laterally to form clumps. The leaves, which grow in dense profusion, are tubular, five to eight inches long; and the flowers, which are borne in umbels, are purplish, pinkish, or violet. Aside from the use of the leaves as a flavoring for soups, stews, salads, etc., the plants are frequently used for ornamental purposes, since they make excellent edgings for flower-beds. They are readily propagated by division, a process that should be performed as soon as the clumps become very dense. The plants do well in any good garden soil with no attention except weeding, and they may be clipped for use frequently during the growing season. Their flavor resembles that of onions.

Chizerots (shē-zė-rō) **and Burins,** bŭ-răń, one of those peculiar races in France that live isolated in the midst of the rest of the population, and are despised and hated by their neighbors. They are found in the arrondissement of Bourg-en-Bresse, in the department of Ain; and the communes of Sermoyer, Arbigny, Boz, and Ozan belong to them. According to tradition, they are descended from the Saracens. Though industrious and prosperous, they are held in the utmost contempt and detestation by their peasant neighbors, often themselves indolent and destitute. They are looked upon as covetous and malicious, and scarcely would the daughter of a small farmer or well-to-do day-laborer become the wife of one of them, so that they mostly marry among themselves. From time immemorial, they have been field-laborers, cattle-dealers, butchers, and the like. Many of them are very good-looking, the young women in particular being handsome and clear-complexioned, with large black eyes.

Chladni, HLÄD'NĒ, **Ernst Florens Friedrich,** German physicist, one of the founders of the science of acoustics: b. Wittenberg 30 Nov. 1756; d. Breslau 4 April 1827. He adopted the profession of jurisprudence, which he practised first in his native town, and afterward at Leipsic, but his natural taste led him to study music, and to devote his leisure to physical science. The backward state of the theory of music compared with the other physical sciences early opened up to him a neglected mine of scientific discovery; and at the age of 19 he set himself resolutely to investigate it. By covering plates of glass with fine sand, and causing them to vibrate, he discovered the fundamental fact in the science of acoustics, that the communication of vibrations in material bodies is subject to constant mathematical laws. See SOUND. His scientific investigations led him to travel through the principal countries of Europe and visit its principal capitals. He invented the euphone about 1789 and clavicylinder 1800, instruments more curious than useful, in which musical sounds are produced by friction, and by the revolution of a glass cylinder causing the vibration of chords. His scientific works are of quite a different value. The first of them, 'Entdeckungen über die Theorie des Klanges,' appeared in 1787; 'Acoustics' (which he himself translated into French, 1809), in 1802; 'Neue Beiträge zur Akustik,' (1817); 'Ueber Feuer meteore,' (1820).

Chladni Figures. See SOUND.

Chlamydosaurus, klăm-ĭ-dō-sâ'rŭs. See FRINGED DRAGON.

Chlamydophorus, a genus of armadillos, containing the pichiciago. See ARMADILLO.

Chlamys, klā'mĭs. (1) In ancient Greek costume, a light and freely-flowing scarf or plaid, worn as an outer garment. It was oblong in shape, generally twice as long as its width, and was worn, according to taste or circumstances, in different ways. The chlamys of the youth was probably of a yellow color, while that of the soldier was scarlet. It was also carried by hunters and travelers, and some Romans are recorded as having adopted it. (2) In zoology, the name of a genus of coleopterous insects, belonging to the sub-tribe *Cyclica*, and the family *Chrysomelidæ*. There are but few North American species, and none of large size.

Chloasma, klō-az'mą, a peculiar pigmentation of the skin, of a yellowish, brownish to blackish shade, and due to a number of causes: (1) mechanical; (2) chemical; (3) thermal; (4) parasitic. Scratching is one of the most frequent mechanical causes. The irritants of mustard plasters, capsicum, cantharides,—all may cause an abnormal skin pigmentation. Sunburn is a frequent cause, a bringing out of the spots with greater vividness. Parasitic fungi have been known to cause it. In addition there are a large number of miscellaneous conditions associated with these liver spots. Pregnancy, menstruation, constipation,—one or all may emphasize their characters. Certain diseases, such as syphilis, Addison's disease (q.v.) in particular, and forms of anæmia are associated with excessive pigmentation. In only a small proportion of the cases has the liver anything to do with the condition.

Chlopicki, HLŌ-PĬT'SKĒ, **Joseph,** Polish general: b. Galicia 24 March 1772; d. Cracow 30 Sept. 1854. He served under Kosciuszko, during the first revolt of the Poles (1794), and then engaged in Napoleon's service, under whom he took part in the battles of Eylau, Friedland, Smolensk, and Moskowa. After the fall of Paris in 1814, he conducted back to Poland the débris of the Polish-French contingent, and was created general of division by the czar. On the outbreak of the Polish revolution of 1830, he was elected dictator, but soon resigned that office, fought at Grochow and Wavre, and after the cessation of hostilities, retired into private life.

Chlo'ral, a chemical substance resembling aldehyde in many of its properties, and obtainable from aldehyde by the action of chlorine gas. In its practical manufacture, however, it is formed by passing chlorine through cold absolute alcohol; a crystalline alcoholate of chloral is thereby formed, from which the chloral itself is afterward set free by the action of sulphuric acid. Chloral is a colorless liquid at ordinary temperatures, having the formula $CCl_3.CHO$. It freezes at about —100° F., and boils at 208° F. It combines directly with water, forming chloral hydrate (q.v.), $CCl_3.CH(OH)_2$, which is the substance commonly but incorrectly called "chloral."

Chloral Hydrate, a crystalline solid composed of trichloral aldehyde with one molecule of water. The crystals are single, colorless, and transparent rhomboids with an aromatic penetrating and smarting taste and slightly acrid odor. They are freely soluble in water, alcohol, and ether. Chloral hydrate is a powerful germicide but is rarely used as such save to preserve anatomical preparations. It is a vesicant and a local analgesic. In small doses it causes burning sensations of the stomach, but little general action. Full medicinal doses, 5 to 15 grains, cause a slowing of the pulse, dilatation of the arterioles, lowering of blood pressure, and slowing of the respiration. On the nervous system it acts as a depressant, causing sleep by direct action on the brain cells. Large doses cause poisoning with symptoms of collapse, coma with a feeble, thready pulse, lowering of temperature, cyanosis or lividity, cold perspiration, dilated pupils, and loss of reflexes. Death results from respiratory and cardiac paralysis. Treatment of poisoning is by rousing patient to maintain respiratory centre, artificial heat, artificial respiration, hot coffee by mouth or rectum, and cardiac stimulants. Chloral is particularly valuable in insomnia from overwork and in many of the convulsive disorders, titany, myoclonus, status epilepticus, and delirium tremens. Its action is possibly due to the formation of chloroform in the general circulation, by the action of the alkalis contained in the blood, in accordance with the equation $CCl_3.CH(OH)_2 + KOH = CHCl_3 + H_2O + CHO.OK$, the last formula in this equation being that of potassium formate. It is also useful in states associated with high arterial tension if the heart is not weakened. Within recent years a large number of allied drugs have been introduced. They have similar actions but are more palatable or are thought to cause less heart depression. Among these may be mentioned, chloralamid, chloretone, chloralose, and urethan.

Chloralamide, klō-răl'ą-mīd, or **Chloral For'mamide,** fôr'mą-mīd, a substance formed by the action of formamide upon chloral, and usually obtained in lustrous, colorless crystals with a slightly bitter taste. It has the chemical formula $CCl_3.CH\langle^{OH}_{NH.CHO}$ melts at 240° F., and is soluble in 20 parts of water and in a much smaller quantity of alcohol. It is not decomposed by dilute acids, but is decomposed by alkalis, and also by water at temperatures above 140° F. See also CHLORAL.

Chloralimide, klō-răl'ĭ-mīd, a substance occurring in long, colorless, needle-like crystals, with the formula $CCl_3.CH:NH$. It is insoluble in water, but dissolves readily in alcohol, ether, and chloroform. It is used in medicine as an antipyretic and analgesic, and must not be confounded with chloralamide (q.v.).

Chlorastrolite, klō-ras'-trō-līt, a mineral found in the form of rounded pebbles on the shores of Isle Royale, Lake Superior, and derived from the trap rock in the vicinity. It is bluish-green in color, with a hardness of 5.5 and a specific gravity of 3.18. According to Hawes it is an impure variety of prehnite, but for optical reasons Lacroix classes it under thomsonite. Its name is from the Greek and signifies "green star," in allusion to its color and its stellated structure.

Chlo'rates. See CHLORIC ACID.

Chlo'ric Acid, a colorless, strongly acid liquid, having the formula $HClO_3$ and a specific gravity of 1.28. It combines with bases to produce the salts known as chlorates. Potassium chlorate is formed directly when chlorine gas is passed through a warm, concentrated solution of caustic potash. By treating this salt with sulphate of ammonia and adding barium hydrate, barium chlorate, $Ba(ClO_3)_2$, is formed, from which chloric acid is set free by the action of sulphuric acid. Chloric acid has powerful bleaching properties, owing to the facility with which it parts with its oxygen. Paper that is dipped into a strong solution of the acid takes fire spontaneously upon drying. The most important salt of chloric acid is potassium chlorate, which is largely used in the preparation of oxygen gas, in the manufacture of matches, and in medicine. It crystallizes in monoclinic plates having a specific gravity of 2.35.

Chlo'ric Ether, a name given (1) to spirits of chloroform, a liquid consisting of one part of chloroform to nine of alcohol, and (2) to chloride of ethyl, $C_2H_5.Cl$, which is obtained by passing dry hydrochloric acid gas through alcohol.

Chlorides. See HYDROCHLORIC ACID.

Chlorim'etry, the art of estimating the quantity of chlorine present in bleaching-powder or any other hypochlorite. Several methods are employed, depending for their success upon the oxidizing power of chlorine. See CHEMICAL ANALYSIS.

Chlorine, klō'rĭn, a gaseous element, discovered in 1774 by Scheele, who named it dephlogisticated marine acid. The term "dephlogisticated" had exactly the same import as "oxygenated," which was soon afterward introduced by Lavoisier. Davy showed that the substance is not a compound of oxygen, but a simple body or element, and from its peculiar yellowish-green color the name "chlorine" was given to it. Chlorine gas is obtained by heating a mixture of hydrochloric acid and finely powdered peroxide of manganese, and may be collected either in bottles over warm water in the pneumatic trough, or by simply leading the delivery-tube to the bottom of the collecting-bottle, and allowing the chlorine to displace the air. The reaction is

$$MnO_2 + 4HCl = 2H_2O + MnCl_2 + 2Cl.$$

Deacon's process for the commercial manufacture of chlorine consists in passing a mixture of hydrochloric acid gas and hydrogen over tiles that are soaked in a copper salt, and then dried and heated to a temperature of about 700° to 750° F. At this temperature the hydrochloric acid gas is decomposed with the formation of water and liberation of chlorine; the copper salt being apparently unaffected by the action. Chlorine is now largely (and perhaps chiefly) manufactured by the electrolysis of a solution of chloride of sodium (common salt).

Under ordinary atmospheric conditions chlorine is gaseous, but it condenses into a mobile yellow liquid at a pressure of about four atmospheres. It also liquefies at the ordinary atmospheric pressure at about 28° F. below zero. It has the chemical symbol Cl, and its atomic weight is usually given as approximately 35.4 for H = 1. It is two and a half times heavier

than atmospheric air, and has an insupportable suffocating odor. When pure it occasions immediate death to an animal immersed in it; but even when largely diluted with common air it cannot be respired with safety. It occasions a severe sense of stricture at the breast, which renders it impossible to make a full inspiration. Chlorine is somewhat soluble in water, the solution having the color and odor of the gas. If the solution be cooled, long yellow crystalline needles deposit, consisting of a hydrate of chlorine. When exposed to sunlight the solution gradually loses its color, oxygen is liberated, and the water contains hydrochloric acid in solution. The great affinity of chlorine for hydrogen is one of its most characteristic properties, and is exhibited in a number of reactions. If equal volumes of hydrogen and chlorine gas be mixed in the dark and then exposed to diffused daylight, gradual combination takes place; and if the mixture be exposed to direct sunlight the gases combine at once with an explosion and produce hydrochloric acid. This is the only compound these substances form with each other, and it is one of the most important of the acids. When a lighted taper is immersed in a jar of chlorine, it burns with a smoky flame; this is due to the combination of the chlorine with the hydrogen only, and the liberation of the carbon. Similarly, when hydro-carbons like turpentine and olefiant gas are mixed with chlorine and a light applied, a ruddy flame with a copious deposition of carbon shows that the hydrogen and chlorine are alone combining. Several of the elements catch fire when immersed in chlorine, for instance, phosphorus, arsenic, antimony, and copper; while others combine with it at a higher temperature, sometimes with vivid combustion as in the case of potassium. The binary compounds of chlorine with the other elements are termed chlorides, and next to the oxides they are the most abundant and widely distributed substances in the earth, many of them being also of great importance for manufactures. Common salt, the chloride of sodium, is the most plentiful of all, and forms large rock masses in various parts of Europe, and occurs dissolved in the waters of the ocean and of many salt lakes. It is the ultimate source of all the hydrochloric acid and chlorine of commerce. Other chlorides, as of potassium, calcium, etc., are met with, but in no case nearly so abundantly as common salt. As a class, the metallic chlorides are crystallizable salts, readily soluble in water, some being even deliquescent. The chloride of silver, the subchloride of mercury, and one or two others are, however, insoluble in water, while a few are decomposed by water. From its wide affinities and great activity in the free state, chlorine is one of the most useful and powerful instruments with which the chemist deals. By it such metals as platinum and gold are attacked and made soluble in water, while its power over organic substances is very great, and has resulted in the formation not only of a number of compounds by simple union with it, but of a great number into which the chlorine has entered more intimately and produced what are called substitution compounds.

Chlorine is largely consumed in the arts. Thus it is used in the manufacture of potassic chlorate, in the conversion of the yellow to the red prussiate of potash, in the preparation of chloride of sulphur for vulcanizing, and above all as a bleaching and disinfecting agent. This last property is exercised by chlorine by virtue of its power of decomposing water by combining with the hydrogen and liberating oxygen, which latter substance is the true agent in the operation, and which converts the coloring matter into colorless compounds. Berthollet was the first to apply chlorine to the process of bleaching. The method of using it has been successively improved. It consisted at first in subjecting the thread or cloth to be bleached to the action of the gas itself; but the effect in this way was unequally produced, and the texture was sometimes injured. It was then applied in a dilute aqueous solution. The thread or cloth was prepared as in the old method of bleaching, by boiling first in water and then in alkaline lye; it was then immersed in the diluted chlorine, and this alternate application of alkali and chlorine was continued until the color was discharged. The offensive suffocating odor of the gas rendered this mode of using it, however, scarcely practicable; but the odor was found to be removed by a weak solution of potash; lime immersed in water, being more economical, was afterward substituted. Later a compound of chlorine and lime was employed, prepared by exposing slaked lye to chlorine gas; the gas is quickly absorbed by the lime, and the chloride of lime, or bleaching-powder, as it is called, being dissolved in water, forms the bleaching-liquor now generally employed. (See BLEACHING-POWDER.) In using it the cloth is first commonly steeped in warm water to clean it, and is then repeatedly washed with an alkaline solution so diluted that it cannot injure the texture of the cloth; the cloth is then washed and steeped in a very weak solution of chloride of lime, again washed, acted on by a boiling lye as before, and again steeped in the solution; and these operations are performed alternately several times. The cloth is lastly immersed in very dilute acid, which reacts on the bleaching-powder and liberates chlorine; this then attacks the coloring matter, and the cloth soon acquires a pure white color. It is next repeatedly washed with water to remove the last traces of the lime salts, and then it is exposed to the action of a hyposulphite in order to render inoperative any chlorine that may remain. (See ANTICHLOR.) The cloth is finally washed, dried, and dressed. When sulphuric acid is used to liberate the chlorine it is found more difficult, in the subsequent washing, to remove the calcic sulphate formed, on account of its sparing solubility in water. To avoid this, chloride of magnesia has been substituted for the chloride of lime. It is easily prepared by adding sulphate of magnesium to a solution of chloride of lime and straining off the clear fluid. It has the same bleaching power, is easily removed by washing, and is said to leave the cloth in a more supple state then when ordinary bleaching-solution has been employed. Another important application of chlorine gas and of bleaching-powder is to the destruction of disease germs. Acid vapors, sulphurous acid in particular, under the form of the fumes of burning sulphur, are often employed for that purpose; but chlorine is superior to any other agent, and is now widely employed for the purposes of fumigation and disinfection.

In medicine, chlorine gas dissolved in water is used extensively for bactericidal purposes. It is employed as a mouth-wash and for bathing

purposes, being both a deodorant and a bactericide; and internally has been used for its germicidal properties, particularly in typhoid fever.

Chloris, klō'ris. (1) The Greek goddess of flowers and the wife of Zephyrus, identical with the Flora of the Romans. (2) The daughter of the Orchomenian Amphion, the wife of Neleus and the mother of Nestor. (3) The daughter of the Theban Amphion and of Niobe. When the children of Niobe was killed she alone escaped along with Amyclas, and became so pale from terror that her former name of Melibœa was exchanged for that of Chloris.

Chlo'ris, or **Prairie Chloris** (*Chloris verticillata*), a genus of grasses, of which there are some 60 or more species, mostly natives of warm, dry countries. About 10 of these species are found on the prairies, from Kansas to Texas. *Chloris radiata* is a pretty annual grass frequently cultivated in greenhouses for the sake of its ornamental and curious appearance.

Chlo'rite Group, in mineralogy, a group of minerals crystallizing in the monoclinic system, exhibiting a green color from the presence of ferrous iron, and chemically definable as hydrous silicates of aluminum, ferrous iron and magnesium. They are usually secondary minerals, derived from pyroxene, amphibole, and other forms. They exhibit a marked basal cleavage suggestive of mica; but they differ from mica and its allies by not containing any considerable amounts of calcium or of the alkalis.

Chlorite Schist, shīst. As chlorite is a general name for green secondary hydrated silicates, containing alumina and iron, derived particularly from augite, hornblende, and biotite, so chlorite is used as a prefix to various names of rocks that contain such silicates, for example, chlorite schist. In the wide belt of Algonkian and Archæan rocks stretching from Labrador to the west end of Lake Superior are great areas of chlorite schists resulting from the alteration of sedimentary as well as igneous rocks.

Chlorodyne, klō'rō-dīn or -dēn, a proprietary mixture of uncertain composition, and best represented by the National Formulary formula, which is a mixture of chloroform, cannabis indica, morphine, and tincture of capsicum. Practically all of the chlorodynes on the market contain morphine, and hence are dangerous poisons. Their sale should not be permitted save on a physician's prescription.

Chlor'oform ($CHCl_3$, trichloromethane, methenyl chloride, terchloride of formyl), a heavy, clear, colorless, mobile, and diffusible liquid of a sweet burning taste and characteristic ethereal odor formed by the action of the sun's rays on a mixture of chlorine and marsh gas; also by the action of caustic potash on chloral or chloracetic acid, or by the action of nascent hydrogen on tetrachloride of carbon. It is prepared on a large scale by distilling water and alcohol with bleaching powder. Its vapor density is four times that of air. Its specific gravity should not be below 1.49, and it should be soluble in 200 volumes of cold water, and in all proportions in alcohol, ether, benzol, benzine, and fixed and volatile oils. It is volatile, even at low temperatures, boils at 140° F. and freezes at —94° F. It should not be exposed to the light, as it is liable to decomposition with the liberation of hydrochloric acid and chlorine.

As used in medicine it is a liquid consisting of 99 to 99.4 per cent by weight of absolute chloroform and 1 to 0.6 per cent of alcohol. It is not inflammable, but its vapor burns with a greenish flame. It is an excellent solvent for a variety of substances, as caoutchouc, resins, fats, alkaloids, etc. Medicinally it is used as an aqua, emulsion, liniment, spiritus, and pure U. S. P. chloroform. Its physiological action is allied to the alcohols, but it is much more energetic. Externally chloroform is an irritant, and if confined on the skin it can cause blistering. It is irritant to mucous membranes, and, taken into the stomach, causes a sense of warmth and burning with increased production of gastric secretions. In large doses it causes violent gastro-enteritis.

Its chief use in medicine is as a general anæsthetic, for which purpose it was first used by Simpson, of Edinburgh, in 1848. As an anæsthetic its vapor is inhaled; it thus enters the circulation through the blood circulating in the lungs. When so administered the stages of anæsthesia closely resemble those induced by others of the alcohol series, but in chloroform the anæsthesia is very rapid. There is first a stage of excitement, with heightened cerebral activities. This is soon followed by a gradual dissolution of the mental faculties, usually in an order the reverse of their complexity. Thus the highest faculties of judgment, memory, etc., are attacked first, then unconsciousness gradually sets in. The spinal cord centres are then affected; there may be some temporary irritation, which is followed by paralysis, and then by loss of sensation and of the reflexes. The automatic centres of breathing and the heartbeat are only slightly affected. There may be some lessening of heart action, following an initial stimulation, and similar respiratory changes. The patient thus in complete anæsthesia is motionless and senseless, unable to feel or move, his automatic functions of most vital importance to life-maintenance alone functionating. It is in this stage that operations are performed, although minor operations may be performed in the early stages of primary anæsthesia.

When the administration of chloroform is pushed too far, or there is a peculiar susceptibility to its effects, as in some individuals, poisoning results. It is usually rapid in onset, is attended with cyanosis, weak, trembling pulse, and reduction of blood pressure. The vasomotor system seems to be paralyzed, and death is due perhaps to this alone, although other factors seem to be involved at times. Following chloroform anæsthesia, nausea and vomiting are apt to occur. Chloroform is a safe anæsthetic, deaths to the proportion of 1:3,000 or 1:4,000 are said to occur; hence ether, which has a proportion of 1:16,000 is preferred by many. This is so particularly in America, whereas in Europe chloroform is preferred. See ANÆSTHETICS; ETHER.

Chlo'rophane, in mineralogy, a variety of fluorspar, or fluorite, which, when heated, shines with a green phosphorescent light. It is found at Trumbull, Conn., and in the mica mines of Amelia County, Va.

Chlorophyll, klō'rō-fil, the green coloring matter of plants. It plays an important part in the life of the plant, as it breaks up the carbonic

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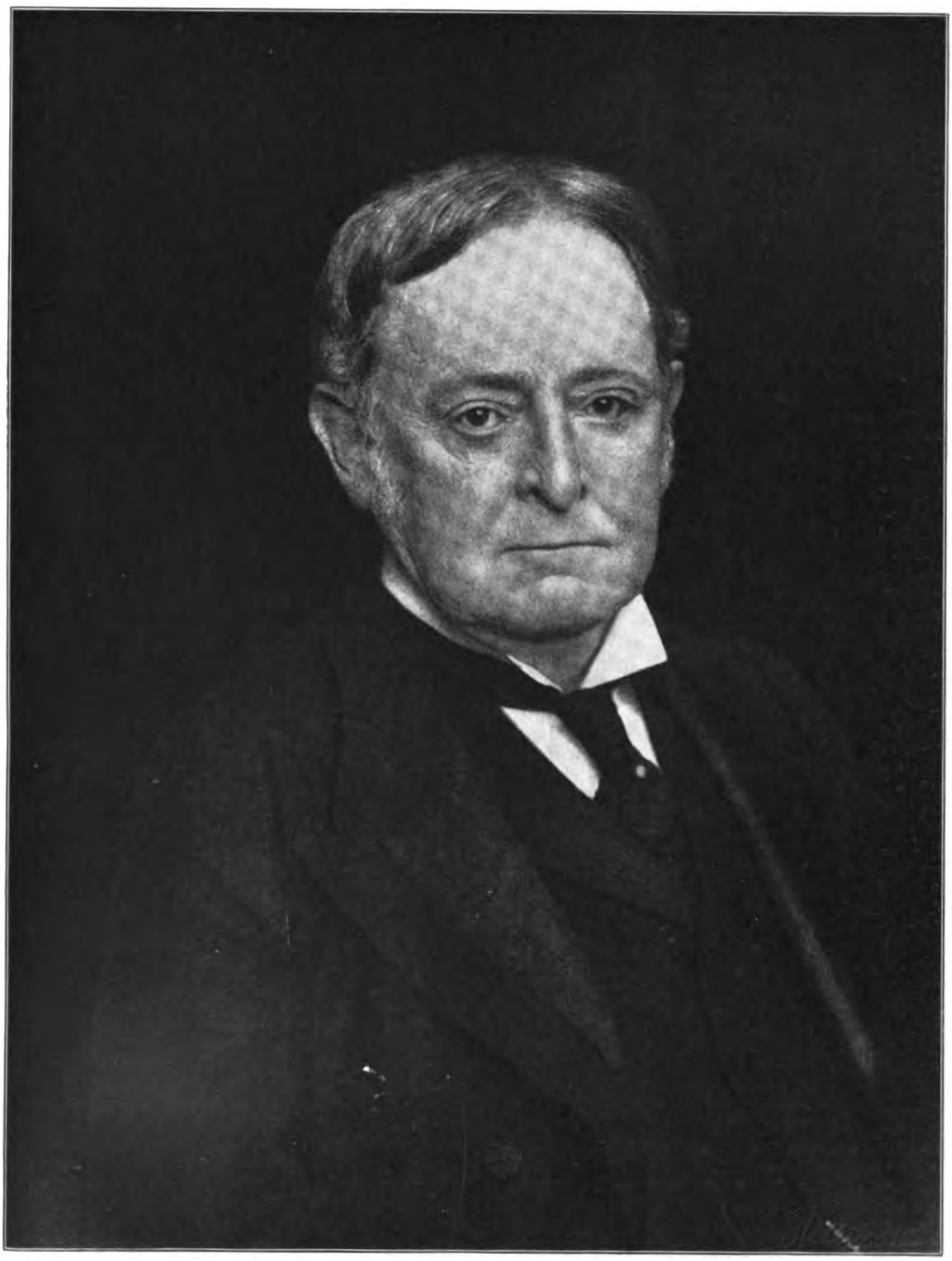

JOSEPH HODGES CHOATE.

Mau

acid gas taken in by the stomata of the leaves into its two elements, carbon and oxygen, returning the oxygen to the air, and converting the carbon with the water obtained from the roots into starch. Light is indispensable to the formation of chlorophyll, and hence arises the etiolation or blanching of plants by privation of light, either by the art of the gardener or from accidental causes.

Chlorophyllite, klō-rō-fil'īt, an alteration product of the mineral iolite (q.v.). The only difference in composition is a larger percentage of water, but there is a marked decrease in hardness, from 7 to from 1.5 to 3, and also in transparency. The characteristic blue color of iolite is changed to a dull green, while a basal cleavage is highly developed. Its specific gravity is 2.7. It is found at Unity, Me.

Chloro'sis, an anæmia occurring in young girls about the period of puberty and characterized by a low percentage of hemoglobin in the blood. It is common in blondes, and in ill-fed and house-confined individuals. The chief symptoms are sickly greenish pallor, hence the name green-sickness, marked debility, breathlessness, palpitation, and tendency to fainting. There is frequently mental depression, irritability, and often perversion of the appetite. The most characteristic changes are in the blood. Here the number of red cells may be normal or slightly diminished, but the percentage of hemoglobin is reduced one half or even more. There is no marked leucocytosis. Gastro-intestinal symptoms may be present. Constipation is the rule. There may be anæmic heart murmurs; the pulse is soft and full; and in many cases there is a low persistent fever. Headaches, neuralgias, and cold hands and feet are prevalent. The treatment is by means of open air, exercise, iron, arsenic, full diet, and pleasant occupation.

Chlorosis is also one of the most formidable diseases to which plants are liable, often admitting of no remedy. It consists in a pallid condition of the plant, in which the tissues are weak and unable to contend against severe changes, and the cells are more or less destitute of chlorophyll. It is distinct from blanching, because it may exist in plants exposed to direct light on a south border, but is often produced or aggravated by cold, ungenial weather and bad drainage. The most promising remedy is watering them with a very weak solution of sulphate of iron. Many forms of the disease exist, of which those of clover, onions, cucumbers, and melons are best known.

Chmelnizkij, Nikolaj Ivanovich, nē'ko-lī ē-vän'ō vĭch нмĕl-nĭt'skē, Russian writer: b. 1789; d. 1846. He contributed largely to the reformation and elevation of the Russian stage. Among his comedies are: 'The Babblers'; 'Air Castles'; 'The Waverer.'

Chmielnicki, нмē-ĕl-nĭt'skē, **Bogdan,** Cossack chief: b. 1593; d. 25 Aug. 1657. He was the son of a Polish nobleman, who settled among the Cossacks of the Ukraine. This people, who had long defended the eastern boundaries of Poland against the Tartars and Russians, were at that time subjected to grievous oppression. Their religion was persecuted, their freedom circumscribed, and the castle of Kudak, called the curb of the Cossacks, was built to restrain them. Thus exasperated, they seized Kudak and massacred the garrison, but were soon subdued. After their defeat at Kumejki, Bogdan was sent to the Polish court, where he was favorably received, but suspicion soon drove him forth, and finally made him a scourge of Poland. Availing himself of the hatred and prejudices of the Cossacks, he entered upon a conspiracy against the Poles, and sought the alliance of the khan of the Tartars. Chmielnicki became master of the Ukraine, and carried terror, devastation, and death as far as Lemberg and Zamosc. Under the new king, John Casimir, the war was continued with equal cruelty on both sides. Chmielnicki put himself under the protection of Turkey, of Russia (1654), and again under that of Poland (1656).

Choate, Joseph Hodges, American lawyer and diplomat: b. Salem, Mass., 24 Jan. 1832. He was graduated at Harvard University in 1852, and at the Harvard Law School two years later. After practicing law in Boston for a year he went to New York city, where he achieved remarkable success as a lawyer, becoming in 1884 a member of the famous legal firm of Evarts, Choate and Beaman. He won great distinction as a trial lawyer conducting many celebrated cases in State and Federal Courts and International tribunals. He successfully defended General Fitz John Porter, prosecuted the infamous Tweed Ring, appeared in the Tilden Will contest, the Chinese Exclusion cases, the Income Tax cases of 1894, and represented the Canadian government in the Bering Sea dispute. In 1856, he became active as a republican in supporting John C. Fremont. In 1894 he was president of the New York State Constitutional Convention. In 1896 he was a candidate for United States Senator but was defeated by T. C. Platt. President McKinley appointed him in 1899 to succeed John Hay as ambassador to the Court of Saint James. Mr. Choate is famous as an orator and shares with Chauncey M. Depew, the title of leading humorous after-dinner speaker of this country. Consult Clemens, 'Choate Story Book' (1900).

Choate, Rufus, American lawyer: b. Essex, Mass., 1 Oct. 1799; d. Halifax, N. S., 13 July 1858. He was graduated at Dartmouth College in 1819; was admitted to the bar and began practice in Danvers in 1823; removed to Salem in 1828; and was a member of Congress in 1830–4, resigning in the latter year. Removing to Boston in 1834, he rapidly acquired a large practice. He was successor of Daniel Webster in the United States Senate in 1841–5; resuming his legal practice in Boston at the expiration of his senatorial term. He traveled in Europe in 1850, and was a delegate to the Whig National Convention in Baltimore in 1852. After Webster's death Mr. Choate was acknowledged the leader of the Massachusetts bar. He made many political speeches, the most brilliant, while a United States senator, including those on the Oregon Boundary, the Tariff, the Fiscal Bank Bill, the Smithsonian Institution, and the Annexation of Texas. His style is peculiar and characteristic, but hardly to be commended as a model for imitation; it is rich, vivid and glowing, instinct with passion, and colored with all the hues of fancy, but sometimes, it must be admitted, a little extravagant and exaggerated. The most remarkable qual-

ity, however, in his written compositions, is the structure of his periods. These are not the short and compact statements, involving but a single proposition, in which most writers of our times express their thoughts; but they recall and renew the continuous sweep and long-resounding march of the prose writers of the 16th century. They are often of breathless length, containing clause after clause, modifying, enlarging, or limiting the leading idea. His 'Addresses and Orations' appeared in a sixth edition in 1891. See Brown, 'Life of Rufus Choate' (1870); Neilson, 'Memories of Rufus Choate' (1884); Whipple, 'Recollections of Eminent Men' (1886).

Chocks, pieces of wood employed on shipboard as wedges to support various articles liable to be displaced by the motion of the vessel. They receive different names according to the purposes for which they are used, as "anchor-chocks" to support the anchor; "rudder-chocks" to keep the rudder immovable, in the event of accident rendering it unmanageable. Chocks are also used to support casks, boats, and other curved objects.

Choc'olate (Mex. *chocolatl,* from *choco,* cocoa, and *latl,* water), a cake or paste prepared from the seeds of *Theobroma cacao,* made by mixing the seeds with water and grinding them very finely. When this is done by machinery, the mill is usually constructed of heavy metal rollers turning in a circular course upon a flat metal plate. A curved knife or scoop attached to the rollers returns the paste continually to be crushed and recrushed by the rollers until it becomes almost impalpable. The object of this is to render the nut, otherwise difficult of solution, readily diffusible in water or milk when used as a beverage. The paste, when unmixed, or mixed only with flour or other farniaceous material, is usually called cocoa, but when much sugar or spices such as vanilla, cinnamon, etc., are added, it bears the name of chocolate. The two names are much confounded commercially. Chocolate is molded into cakes, or sold in powder or flakes formed by simply drying the paste as it comes from the mill. The seeds or nuts contain a large proportion (30 to 50 per cent) of oily matter (cocoa butter). This may be partially removed or all retained in the chocolate. In the latter case much of it is mechanically adherent to the sugar or farinaceous matter. Chocolate was introduced from America to Europe by the Spaniards. It is highly nutritious, containing a large proportion of nitrogenous flesh-forming material. On this account it is used as portable food by many mountaineers. In the solid form, mixed with much sugar, cream, and various confections, it is largely used as a sweetmeat, and in pastry.

Choc'taw (properly **Cha'hta,** the chief "Chactas" in Chateaubriand's 'Atala' is an eponym of the tribe), one of the largest tribes of the great Muskhogean (q.v.) stock, and before its deportation the most advanced in husbandry and general culture of any except the Creeks. They were called "Flatheads" by the French (not to be confused with the northwestern tribe of that name), from a habit of flattening their children's skulls with bags of sand; and they had a burial custom of disinterring the corpses after a few days, cleaning the bones, and preserving them. They are rather short, stout, and slow, compared to the taller and more active Chickasaw (q.v.); and were nicknamed "tubbies," though not on that ground, but from the customary final word of their war-chiefs' names, meaning "killer." The Chickasaw was one of their subdivisions, or perhaps merely the more warlike and adventurous portion, till after the whole had crossed the Mississippi; and while using a dialectic language of their own for common service, still employed Choctaw for oratory. The Choctaw occupied central and southern Mississippi and western Alabama in three divisions, west of the Muskhogee; and in the 18th century their chief towns lay in two groups, one some 200 miles north of New Orleans (about the present Choctaw County, Miss.), and the other about half way from the Chickasaw to Mobile. These villages a century earlier had been numerous and widely distributed; they are stated at 40, and the tribe as having 2,500 warriors. It was first found by De Soto in his expedition of 1540. At their town of Mavila (Mobile, probably Choctaw Bluff, Clarke County, Ala., on the north bank of the Alabama), was fought perhaps the bloodiest and most destructive single battle ever known between red and white men on the continent. The village was burned, 20 of De Soto's men killed and 150 wounded, and many hundreds of Indians slain — the Spanish chroniclers say 2,500 to 3,000, which may be discounted. Tristan de Luna met them again in 1560. The French, in settling this region about 1700, came immediately in contact with them, and established friendly relations with them, contrasting strongly with the permanent hostility of the Chickasaw, against whom and the Natchez the Choctaw aided the French. The latter planted forts in their country, and sent missionaries among them. In the final struggle between France and England, however, the English won over a part of them, including the chief Red Shoes. After the Revolution, the Choctaw shared with the other Indians in the general treaty of Hopewell 28 Nov. 1785, by which the sovereignty of the United States was recognized, a portion of the Choctaw lands ceded, and they were "guaranteed" the possession of the rest. By 1800 some 500 of them had migrated to the Arkansas (Indian Territory), and it is said that the rest were much less unwilling to go than the Cherokees and Creeks. They did good service to the Americans in the Creek war 1813–14. In 1820, by the treaty of Doak's Stand, they ceded part of their lands for an equivalent amount on the Arkansas; and in 1830, by that of Dancing Rabbit Creek, they gave up the rest — 19,000,000 acres, or nearly 30,000 square miles, in the two cessions, for 20,000,000 acres in Indian Territory and $2,225,000 in money and goods. In 1837 they removed with the Chickasaw to their new lands, between the Arkansas and Canadian rivers on the north and the Red River on the south. How the Chickasaw first amalgamated with and then separated from them is told under CHICKASAW. They made good progress, received the missionaries of the American board and several Church denominations, were given a well-diffused school system, and established a government consisting of a head chief, a council of 40 chiefs, a two-chambered legislature, and a regular judiciary system with trial by jury. Like all the southern tribes, they were slaveholders, and in 1860 had some 5,000 negro

slaves. Their superintendent and agents were Southerners, and they joined the Confederate side in the Civil War. Though their land was not overrun, their progress was brought to a standstill, and their population reduced by a third; and after the War, they were for a time deprived of their rights. On being restored, they had to part with a section of their lands to the government, which settled other tribes there. For a time, a territorial government was formed, with the superintendent as governor; and they had to make heavy allowances to their emancipated slaves. In 1900 there were 10,321 Choctaws proper in the Territory, besides those who had taken up lands in severalty; and some hundreds still remaining in Mississippi. A grammar of their difficult language was published in 1870.

Choczim, HŌ'tsĭm (properly **Khotin**), Russia, a fortified town, on the right bank of the Dniester, opposite to Kaminiec, in Bessarabia. In 1718 the Turks caused it to be regularly fortified by French engineers; but it was taken by the Russians in 1730, 1769, and 1788. As it is completely commanded by the hills which surround it, its value as a fortress is now small. Its chief importance is as a military station. Pop. 16,000.

Chodat, shō-dä, **R.,** Swiss botanist: b. Moutier-Grandval, Jura-bernois, 6 April 1865. In 1889 he became a professor of botany in Geneva University and has been *doyen* of the Faculté des Sciences there, from 1898. He has contributed numerous professional papers to botanical journals, and has published many important monographs.

Chodkiewicz, HŌd-kē-ā'vĭch, **Jan Karol,** Polish general: b. Lithuania 1560; d. Chocim 27 Sept. 1621. He served against the Cossacks, defeated Charles IX. of Sweden in 1605, and afterward served against the Russians and the Turks.

Chodowiecki, HŌ-dō-vē-ĕts'kē, **Daniel Nicolaus,** German designer and engraver: b. Dantzic 16 Oct. 1726; d. Berlin 7 Feb. 1801. He was instructed in miniature painting by his father, and subsequently painted snuff boxes. He was encouraged to study enameling, and soon attracted attention by the beauty and finish of his productions, some of which came under the notice of the academy of Berlin, and procured him a commission to make a set of designs for their almanac. The manner in which he executed these established his reputation. He thenceforth devoted himself almost exclusively to designing and engraving; he produced the plates for Klopstock's 'Messiah,' 'Don Quixote,' Lavater's 'Physiognomy,' editions of Shakespeare, Voltaire, La Fontaine, and many other works.

Chodzko, kōdz'kō, **Jacob Leonard,** Polish scholar: b. Oborek 6 Nov. 1800; d. 1871. Having traveled as secretary of Prince Oginski through nearly all Europe, he established himself in 1826 at Paris, where he published a memoir of the prince, with an introduction entitled 'Observations sur la Pologne et les Polonais' (Paris 1827), and commenced collecting materials for a history of his country from the death of Augustus III. Afterward he published the 'History of the Polish Legions in Italy, Under the Command of Gen. Dombrowski' (1829). During the revolution of July 1830, Lafayette appointed him his aide-de-camp; and after the outbreak of 29 November of the same year in Warsaw, he acted as agent of the revolutionary government in France. He was an active member of the French-Polish and American-Polish committees, and after the failure of the revolution, as member of the national Polish committee of France.

Chœnix, kē nĭks, a measure of capacity among the ancient Greeks. Its size is variously given, and it is probable that it actually differed in the different states of Greece. Some accounts represent it as containing three cotylæ, or about 1.487 pints English; others make it equal to 1.982 pints; and still others give it as equal to 3.964 pints.

Chœrilus, kē'rĭ-lŭs, the name of several Greek poets, among whom Chœrilus of Samos is the best known. He lived in the 5th century B.C., was the contemporary and friend of Herodotus, and composed an epic poem, entitled Persica, celebrating the victory of the Greeks over Xerxes. The fragments of the poem still extant have been collected and explained by Näke (Leipsic 1817). Another Chœrilus, of Iasus, in Caria, is mentioned by Horace, but does not appear to have possessed much poetical talent. He formed part of the train of literary men who accompanied Alexander the Great on his expedition to the East.

Choir. 1. In religious worship, an organized body of singers. In ceremonial Christian religions, and more particularly in the ordering of services in the Church of England, the minor canons, vicars choral, and choristers, or other singers taken collectively, are spoken of as the choir. The choral body in the latter Church is usually divided into two sets of voices, the one sitting on the north and the other on the south side of the chancel, and are known by the respective titles of Cantoris and Decani from their nearness to the Cantor (or Precentor) and to the Decanus (or Dean). In most cathedrals and collegiate chapels, the Decani side is held to be the side of honor, the best voices are placed there, and all the verses or soli parts, if not otherwise directed, are sung by that side, which is also considered the "first choir" (coro primo) in eighth-part music. 2. In architecture, the eastern limb of a cruciform church or the eastern portion of any church. In the latter case it is more commonly styled the chancel (q.v.), and is frequently constructionally lower and narrower than the main part of the building. The ordinary daily services in a cathedral or collegiate church are held in the choir. While architecturally the term choir is applied to the entire portion of the church east of the crossing, the eastern limb is itself divided into three portions: (1) the "ritual choir," containing the stalls for the singers and comprising the western portion of the architectural choir; (2) the presbytery, next east of this, containing seats for the laity (a term sometimes applied to all of the choir east of the "ritual choir"); (3) the sanctuary, containing the altar and sedilia, and divided from the remainder by a low railing. In certain cases there is even a fourth division called the retro-choir, comprising one or more bays east of the sanctuary. These are sometimes, as at Lincoln, Truro, and York, of the same roof elevation as the rest of the choir, but more commonly parts of a lower

structure, as at Hereford, Winchester, and Salisbury. It should be noted that the «ritual choir,» or place for the singers, does not invariably correspond with the architectural choir. Sometimes, as Winchester, Norwich, and Gloucester cathedrals, it includes the crossing and one or more bays of the nave, or again, as at Westminster Abbey, and in Spanish cathedrals generally, it is entirely in the nave, from the remaining portion of which it is separated by a massive wall or screen. In buildings where the ritual choir is entirely east of the crossing, the choir screen is placed between the eastern piers of the crossing. At Gloucester, Exeter, Lincoln, York, Southwell, and several other cathedrals, the organ is placed upon the choir screen. In several English cathedrals the choir is quite as long as the nave, and in some parish churches even longer, but the usual proportion of choir to nave is as one to three. In French churches the choir frequently terminates polygonally with encircling chapels and this termination is known as a chevet, but in England the square east end is the most common in Gothic churches, although in Norman ones the semi-circular apse is not infrequent. In the Middle Ages, the choir, as the most indispensable portion of the church, was erected first, the nave, regarded practically as a stately approach to the choir, was built later, a century or more sometimes intervening between the completion of the choir and that of the nave. At the present time the cathedral of Saint John the Divine in New York is being erected after the mediæval custom, the intention being to wait for some years after the completion of the choir before beginning work upon the nave.

Choir Invisible, The, a novel by James Lane Allen, published in 1897. It is one of his most popular and pleasing stories, and was enlarged from an earlier story called 'John Gray.' Its scene is the Kentucky of 100 years ago, and the fresh picturesque descriptions of pioneer life in Kentucky give the tale historical value.

Choiseul-Amboise, Étienne François, ā'tē-en fräṅ swä shwä-zėl-äṅ-bwäz, DUC DE, French statesman: b. 28 June 1719; d. Paris 7 May 1785. He entered the army in early life, and after distinguishing himself on various occasions in the Austrian War of Succession, returned to Paris, where his marriage with the daughter of the financier, Crozat, gave him the command of great wealth, and his intimacy with Madame de Pompadour furnished the means of gratifying his ambition. After having been ambassador at Rome, where he obtained from the Pope, Benedict XIV., the celebrated encyclical letter intended to appease the disputes which had arisen on the bull Unigenitus, and at Vienna, where he concluded with Maria Theresa the treaty of alliance against Prussia, he became in 1758 minister of foreign affairs. At the same time he was made a duke. He succeeded the marshal of Belle-Isle as minister of war in 1761, and the same year he became also minister of marine. His administration was distinguished by many useful reforms. He reorganized the army and navy, which the disasters of previous wars and the neglect of previous administrations had suffered to fall into decay; negotiated the famous Family Compact which reunited the various members of the Bourbon family, and restored Corsica to France. His fall was brought about in 1770 by a court intrigue, supported by Madame du Barry, the new favorite of the king. He was recalled to court on the accession of Louis XVI. in 1774, but not again intrusted with power.

Choiseul-Gouffier, goo-fē-ā, **Marie Gabriel Florent Auguste de,** COUNT OF, French antiquarian: b. Paris 27 Sept. 1752; d. Aix-la-Chapelle 20 June 1817. He early displayed a particular interest in everything relating to Greece. His wish to visit this country was gratified in 1776, and in 1782 appeared the first volume of 'Voyage Pittoresque en Grèce,' which attracted much attention and procured him a seat in the French Academy in 1784. The two other volumes appeared in 1809 and 1820. The first was entirely revised by him before his death. The same year he was appointed ambassador to Constantinople, where he remained till 1791. The appointment of ambassador to London was then offered to him, but he remained at Constantinople and sent his official correspondence to the exiled French princes. This correspondence having fallen into the hands of the republicans the convention gave orders for his arrest, but he escaped by taking refuge in St. Petersburg, where Paul I. made him a privy-councilor, director of the Academy of Arts, and superintendent of the imperial libraries. He returned to France in 1802 and resumed his seat in the Academy. In 1814 he was made a peer of the realm. His antiquarian researches were chiefly inserted in the memoirs of the National Institute, and his very valuable collection of antiquities is now in the museum of the Louvre.

Choiseul-Praslin, prä-lăṅ, **Eugène Antoine** (ė zhān äṅ twän) **Horace de,** French statesman: b. 23 Feb. 1837. He was first elected to the National Assembly in 1871, and has been several times a member of the chamber of deputies. He is considered one of the leaders of the Republicans. In 1871 he was minister plenipotentiary to Italy; in 1880 he became secretary of state in the ministry of foreign affairs; and in 1887 was sent on a botanical expedition to Ceylon and the United States.

Choisy-le-Roi, shwä-zē-lė-rwā, or **Choisy-sur-Seine,** France, a town in the department of Seine, seven miles south of Paris, on the left bank of the Seine. Its broad, straight streets, elegant houses, and fine avenues, with the proximity of the Seine, contribute to render it one of the most agreeable towns in the vicinity of Paris. In its cemetery is the tomb of Rouget de l'Isle, author of the 'Marseillaise.' It has manufactures of wax cloth, soap, chemical stuffs, glass, morocco leather, earthen-ware, porcelain, and vinegar, and some trade in wine, vinegar, coal, etc. Pop. 11,281.

Choke-cherry (*Prunus virginia*), so called from the astringent nature of the fruit, a shrub from 2 to 10 feet high, rarely a small tree, belonging to the natural order *Drupaceæ*. For commercial uses the wild black cherry (*Prunus serotina*), which is closely allied to *P. virginiana*, is valuable. Its wood is one of the best American woods for cabinet-making. The bark has medicinal properties as a pectoral tonic, and febrifuge. The range of choke-cherry is wide, flourishing along river banks and in rocky situations, from Canada to Florida, and west to Colorado and Texas.

Choke-damp, the name given by miners to the fire-damp resulting from an explosion of gas in mines. The following diagram is illustrative of the combustion of fire-damp, or carburetted hydrogen, of which the product is choke-damp, called also after-damp and black-damp:

Before Combustion. *Wght.*		Elementary Mixture. *Atoms.*	*Wght.*	Products of Combustion. *Wght.*	
8 carburetted hydrogen...	{	1 carbon	6	22	carbonic acid.
	{	1 hydrogen	1	9	steam.
	{	1 hydrogen	1	9	steam.
144 atmosph'ic air.....	{	1 oxygen	8		
	{	1 oxygen	8		
	{	1 oxygen	8		
	{	1 oxygen	8		
	{	8 nitrogen	112	112	uncombin'd nit
152			152	152	choke-damp.

Choking, a stoppage caused by a morsel of food, a drop of liquid, etc., passing into the larynx or upper opening of the windpipe, instead of the gullet, or an obstruction of the œsophagus itself. It is usually followed by a violent fit of coughing which lasts, in slight cases, till the offending substance is expelled. Sometimes, however, a larger mass — for example, a half-chewed piece of meat — is drawn into the opening of the windpipe, completely blocking it, and arresting respiration altogether. This condition is one of extreme danger; the sufferer becomes purple in the face, and if not at once relieved will certainly and quickly die of suffocation. The obstructing substance is usually within reach, and may often be dislodged if a by-stander promptly pushes his forefinger to the back of the throat and attempts to draw the obstruction forward. A child may sometimes be saved by holding it up by the heels and shaking it, or slapping its back. If these measures fail relief may be obtained by means of a sharp-pointed knife promptly pushed into the windpipe to admit air to it below the obstruction. In the case of an animal, remove the obstruction with the hand when possible. Cause the animal to swallow the obstructing substance, if possible, by giving it water, oil or belladonna solution. Carefully push the obstruction down by a probang, if it is possible to effect this, and if withdrawal by the mouth is impracticable. In some cases the gullet has to be cut into by a surgeon.

Cholagogue, kŏl'a-gŏg, a remedy that increases the flow of bile, as distinguished from an hepatic stimulant, which increases the production of bile. Most of the cathartics that stimulate peristalsis affect the gall bladder, causing it to empty itself more energetically. These may be classed in general as cholagogues. See CATHARTICS.

Cholera, kŏl'ĕr-a, an acute, infectious disease, endemic in some localities and epidemic in others, characterized by vomiting and purging of a peculiar rice-water-like fluid, and a stage of collapse.

Etiology.—The prime cause of cholera is one of the most perplexing questions with which scientists have had to deal, and even at this advanced period of scientific investigation it is not definitely known. The claim that it is caused by a germ is not accepted by all. Disease germs, which, according to their form, are known as cocci, bacteria, bacilli, vibriones, and spirilla, are among the smallest units of life; 30,000,000 of them, according to Prof. Max von Pettenkofer, of Munich, weighing only one milligram. In 1884 Dr. Koch claimed that the comma-shaped bacillus was the true cause of the disease, and this theory seems to have met with considerable favor, though it is not yet admitted as a scientific truth. In fact Dr. Koch himself, in an address delivered before the Imperial German Board of Health at Berlin, 30 Aug. 1884, admits that the true cause of cholera is not precisely known, though he invariably found it to exist. Dr. H. Vandyke Carter of London says that the real cholera germ, if such a thing truly exists, has yet to be found. He, too, says he found an organism resembling a vibrio rather than a bacillus, and this he did not find in all cases. He also claims that it would be irrational to suppose that an everywhere widely distributed organism like *Vibriofrugula* can alone be the essential cause of Asiatic cholera. His investigations were all in India, and he did not see an authentic specimen of this organism. Others assert that it is a specific disease originating in India, and the assertion is also made that cholera can arise spontaneously in other countries and is not dependent on a specific cause.

Dr. Koch says that the comma bacilli grow extremely rapidly and reach a maximum in two days; after that they commence to die, and other bacteria form in their place. Temperature has very little to do with their lives, however. They are said to live at temperatures ranging from —15° to 104° F. These bacilli are located solely in the intestines, as, according to Dr. Koch, none have been found to exist in the blood or in any of the other organs. In the lower section of the lower intestines they are found in greatest abundance, also in the dejecta, but not often in the vomit. It is said that the bacilli cannot live in the stomach, and the reason that most deaths occur on Monday and Tuesday is because those days succeed the one in which over-eating and -drinking is usually indulged in, and the bacillus is conveyed into the intestines by the undigested mass of food that passes into them.

How Bacteria Kill.—The question then arises, How is it that this bacterial vegetation in the intestines can kill a man? Bacteria not only consume substances, but also produce others of various kinds, many of which are of a very peculiar nature. Some are of a transient nature and emit an intense smell; others produce coloring matter or some poisonous substance. In the putrefaction of albuminous liquids blood poisons are formed which must be products of vital changes of these bacteria, as putrefaction is only a consequence of bacterial vegetation.

It is asserted that these comma bacilli destroy the blood corpuscles within a pretty wide range, and it is fair to conclude that they also destroy more or less of the surrounding tissues. Mr. Richards, a physician at Goalundo, in India, says that sometimes one can feed the dejecta to animals and do no harm; at other times the dejecta prove fatal and the animals die in cramps. The time required for such animals to die after eating the dejecta is from 15 minutes to two and a half hours.

This reasoning does not go to show that these animals die from a species of bacteria, but

from a poison of some peculiar nature generated from the cholera dejecta, and why this action does not occur in all cases is more than can be explained, unless it is influenced by the contents of the stomach. Some pathologists claim that death is produced by paralysis; others say by mortification of the epithelium and mucous membrane; and again it is said to be due to inspissation of the blood, produced by loss of water. It would seem, however, that death is caused, in many cases at least, by irritation of the nerve centres, and consequently by some peculiar brain lesion.

Dr. Koch concludes that the only way known at present to get rid of the infectious matter of cholera is to dry it, and thus kill the germ. A more important matter, granting the comma bacillus to be the true cause of cholera, would seem to be to learn how to dispose of it in the human stomach before it goes farther and terminates life, which it must surely do when it enters the intestine.

Cholera originated in the East Indies and was not known to migrate for 1,000 years. The oldest Sanskrit writings show that it was known many hundred years before the birth of Christ. In the 17th and 18th centuries there are abundant proofs of epidemics, but it did not spread into Europe until 1830. The Russians took it from India through couriers and stage-coaches. Another peculiarity of this disease is that when it was in Marseilles it broke out in Paris, jumping Lyons, the second largest town in France, notwithstanding the fact that quarantines were in full force.

A Miasmatic Disease.—The cholera germ, like the malaria bacillus, depends greatly upon a moist soil, and if it does not depend upon this, and is not a miasmatic disease, how can it be explained that in India, the home of cholera, it seldom, if ever, occurs on the mountain-tops, proving conclusively that it at least often occurs as a miasmatic disease and may be wholly independent of human intercourse. It must be remembered that in India the inhabitants drink the same water that they wash in, and, as a rule, are exceedingly careless, so it is easy to believe that cleanliness has a great influence in preventing the disease.

'The Lancet' of 15 Jan. 1885 says that a special commission was sent out from England to India to inquire into the cause of cholera, with particular reference to the theory of Prof. Koch that the comma bacillus is the true seed of the disease. The commissioners were Dr. E. Klein and Dr. Heneage Gibbs, both medical men of distinction and accomplished in physiological research. The result of their labors in the very home of cholera is tersely stated by Dr. J. N. Cunningham, the Sanitary Commissioner of the government of British India, when he says that their conclusions "are altogether subversive of the statements advanced by Prof. Koch as to the so-called comma bacillus being the cause of cholera."

Pathological Anatomy of Cholera.— After death the stomach contains more or less of the whey-like albuminous fluid and is full of cast-off epithelium. The small intestines usually contain a large quantity of the whey-like fluid and epithelium. The glands of Brunner, the solitary and agminated patches, are thickened and very prominent. The solitary glands of the large intestines are also infiltrated and swollen. The liver is more or less advanced in fatty degeneration. The kidneys have a pale, white appearance, due to the epithelium blocking the tubes. The bladder is empty and contracted. The lungs are congested. The right cavities of the heart are distended with blood, while the left cavities are empty and contracted.

Cholera is usually ushered in by vomiting, purging, and griping pains in the stomach, and death follows in from 1 to 24 hours. If life is retained longer than this time the patient may possibly recover. A large percentage of the cases die.

Treatment.— Opium, quinine, whiskey, sulphuric acid, camphor, chloroform, chlorodyne, carbolic acid, bismuth, hydrocyanic acid, chloral, and atropia are the favorite remedies. Brown Sequard says the most efficient remedy is the hypodermic injection of morphia with atropia. He, too, says this treatment will prevent an attack of cholera.

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Cholera Infan'tum, an acute infectious disease of infants, due in large part to a definite micro-organism, the *Bacillus shiga,* or allied species, characterized by acute gastro-enteric inflammation, with nausea, vomiting, diarrhœa, temperature, wasting, and prostration. Death may result in a very short time. The child may be attacked suddenly, but it is more liable to occur in children who have been somewhat run down from a mild diarrhœa of indigestion. The child is then taken with the cholera-like diarrhœa, passing thin serous- or rice-water discharges, 10 to 20 a day. The temperature rises abruptly to from 103° to 105° F. and there is constant vomiting. There is rapid emaciation and prostration, the child having strength only to moan or cry with a sharp irritable sound. Dullness, stupor, and at times convulsions precede death. Treatment should be prompt and requires skilled medical attendance. Acute summer diarrhœa of infants is not necessarily cholera infantum. In fact cholera infantum is not a common disease, whereas the acute diarrhœas of children, resulting from tainted foodstuffs, is very common. Every case of summer diarrhœa, however, should receive vigorous treatment, because it offers an opportunity for the *Bacillus shiga* to develop cholera infantum.

Cholesterin, kō les'tĕr-ĭn ($C_{26}H_{44}O$), a substance found in bile, blood, etc., which may be obtained in the form of beautiful pearly crystalline scales, without taste or odor. It is widely distributed in the animal economy, being essential to the brain and nerve substance, and having been found in milk and many portions of the body, both as a normal and as a pathological constituent. Cholesterin was first obtained by Conradi, in 1755, from human gall-stones, in which it is often present in large quantities. It melts at 297° F. It is the chief constituent of lanolin (q.v.), a highly important oily substance that is obtained from the grease of sheep's wool.

Cholet, shō-lā, France, a town in the department of Maine-et-Loire, on the right bank of the Moine, 32 miles southwest of Angers. It has a tribunal of commerce, consulting chamber of manufactures, and communal college. Its manufactures include handkerchiefs and cotton goods, called *cholettes,* flannels, and woolen

stuffs. There are also wool and cotton spinning-mills, bleachfields, dyeworks, and tanneries. There is also a great trade in cattle, the markets for which are attended by a large concourse of buyers from other parts. Pop. 15,000.

Choliambus, kō-lī-ăm'bŭs (Greek, *choliambos,* the lame iambus; also called *skazon,* from *skazo,* to halt; or *versus Hipponacticus,* because the satirist Hipponax of Ephesus made use of it, or perhaps invented it), an iambic trimeter, the last foot of which, instead of being an iambus, is a trochee or spondee, which gives it a lame motion, as, for instance, Martial, l. i. epig. 3:

Cur in theatrum, Cato severe, venisti?
An ideo tantum veneras, ut exires?

We perceive, from the construction of the choliambus, that it may be applied with advantage to produce a comic effect. The Germans have happily imitated this verse, as well as all other ancient metres. An instance of a German choliambus is —

⏑ — ⏑ — — ⏑ — ⏑ — — ⏑
Der Choliambe scheint ein Vers für Kunstrichter.

Cholic (kŏl'ĭk) **Acid** ($C_{24}H_{40}O_5$), a non-nitrogenous acid produced by decomposing the true biliary acids with an alkali. It does not exist in bile ready formed. It is crystalline, sparingly soluble in water, but readily soluble in alcohol and ether. The cholates are rather obscurely crystalline; they are not very soluble in water, but rather more so in spirit. Both the acid and salts have a bitter taste.

Choline, kŏl'ĭn, a basic body found in both plants and animals. In animals it is apparently one of the reduction compounds of proteids, being a trimethyl oxyethyl ammonium hydroxide. It is of interest in medicine chiefly because of its close affinities to two very poisonous compounds, into either of which it may be converted. By oxidation it builds neurine, a highly poisonous body; and by hydration it becomes an alkaloid-like body closely resembling the plant alkaloid muscarine, from the poisonous mushroom *Amanita muscaria.* Thus choline may be one of the auto-intoxicating substances that may be developed in the human body if its normal metabolism is disturbed. It may also be a factor in the so-called ptomaine poisoning.

Cholmondeley, chŭm'lĭ, **Mary,** English novelist. Her fictions have been extremely popular and include 'The Danvers Jewels'; 'Sir Charles Danvers'; 'Diana Tempest'; 'A Devotee'; 'Red Pottage'; 'Love In Extremis.'

Cholochrome, kŏl'ō-krōm, or **Cholophæin,** the brown coloring matter contained in bile and in the intestines, and the substance coloring the fæces and the skin in jaundice.

Cholophæin, kŏl-ō-fē'ĭn. See CHOLOCHROME.

Cholos, shō'lōz, in Peru, the name for those who are partly of white, partly of Indian parentage, the most numerous class of the community.

Cholula, chō-loo'lā, Mexico, a city in the state of Puebla. It is 12 miles west of La Puebla, 60 miles southeast of the city of Mexico. The streets are regular and spacious, the houses mostly of one story, and flat-roofed. Though fallen from the importance it had attained in the early part of the 16th century, it still exhibits traces of its former greatness. Under the name of Chunultecol it was once the capital of an independent district, and the seat of the religion of the ancient Mexicans. It was the great centre of the Aztec worship. At that time it contained, it is said, 40,000 houses and more than 400 temples; one of these temples still remains, though in ruins. It is described by Humboldt as being built in the form of a pyramid, of four stories of equal height, in alternate layers of clay and sun-burned bricks; each side of its base measuring 1,440 feet, and its height in all 164 feet. At the present day it is so altered that it looks at a distance like a natural hill. On one of its highest platforms a chapel has been constructed, in the form of a cross, 90 feet long, with two towers and a cupola. Since the introduction of Christianity, this and other of its temples have been used for Christian worship. Pop. 10,000.

Chondrine, kŏn'drĭn, a substance containing carbon, hydrogen, nitrogen, oxygen, and sulphur, obtained from rib-cartilage by continuous boiling with water, exhausting with ether to remove fat, and drying. Its composition varies slightly according to the material made use of; it contains about 0.4 per cent of sulphur. It is a diaphanous horny mass, insoluble in alcohol, but softening and dissolving in hot water. From this solution it is thrown down as a bulky precipitate by acids, and by the salts of several heavy metals. By boiling with sulphuric acid it is decomposed into leucine, and with hydrochloric acid into a sugar-like body called chondroglycose. Nothing definite is known about its origin or function in the body. It has a marked general resemblance to gelatine, but it is distinguished by giving the precipitates just mentioned with the acids and salts. Infusion of nut-galls precipitates both.

Chondro'ma. See TUMORS.

Chon'dro-sarco'ma. See TUMORS.

Chondropterygii, kŏn-drŏp-tĕr-ĭj'ē-ī. Under this name were included by Cuvier the sturgeons, sharks, rays, lampreys, mud-fish, and lancelet, an assemblage of fishes so unnatural that the possession of fins and gills sums up nearly all they have in common. The term was adopted to give prominence to what seemed a fact of cardinal importance, namely, that the skeleton of the limbs was cartilaginous. In modern systems the *Amphioxus,* or lancelet, is the sole example of an order — *Leptocardii* (Müller) or *Pharyngobranchii* (Huxley) — in which the cranium is purely membranous and scarcely larger than the spinal canal; the spinal marrow is enclosed in a sheath, with only traces of division into vertebræ; and a heart is wanting, the circulation being maintained by the contractility of the blood-vessels. The glutinous hag (*Myxine*), the river lamprey (*Petromyzon*) and its larva (*Ammocœtes branchialis*), represent the order *Cyclostomata,* known also as *Marsipobranchii,* the gills being lodged in pouches. These two groups should, in the opinion of some, form two distinct classes of equal value with the remainder of the fishes, which are divided into the ganoids, or *Ganoidei;* the osseous fishes, or *Teleostei;* the *Selachii,* including the sharks and rays; and the *Dipnoi,* represented by the mud-fish (*Lepidosiren*). The last-named group comes under the *Chondrop-*

terygii of Cuvier, but it is now known to rank very high in the scale among fishes, and to be closely related to the amphibians or to the reptiles, inasmuch as its heart has two auricles, the other fishes having only one, and true lungs co-exist with gills. Again, while the skeleton of the sturgeon is nearly wholly cartilaginous, that of the other ganoids is well ossified, while the structure of the heart and sense organs removes the *Selachii* very far from the lancelet and the cyclostomatous fishes. The cartilaginous or embryonic condition of the skeleton may persist through life among the fishes in association with the highest as well as the lowest development in other respects. The Cuvierian group is therefore now distributed according to the sum of the characters, and the fishes included in it are not massed together simply because one point of structure is common to all.

Chondrostei, kŏn-drŏs'tē-i, an order of bony fishes of lowly and degenerate organization, formerly classed as cartilaginous ganoids. The internal skeleton is but little ossined, the vertebræ and most of the skull remaining in a state of pure cartilage; but the skull is enclosed by close-fitting dermal bony plates, which are peculiar in having a median in addition to paired series. The notochord is largely persistent. The mouth is small, and ventral in position; and the jaws very weak and toothless, or provided with minute teeth. In the gill-cover the opercular bones are reduced in number, and the branchiostegal rays absent or wanting. There are no true scales, but a small number of longitudinal rows of large bony plates, with granules on the intervening skin. The intestine is provided, as in the sharks, with a spiral valve. The elongated snout, stout body, large fins, and strongly heterocercal tail complete the aspect of these survivors of a once dominant race. There are two families, the *Acipenseridæ,* or sturgeons (q.v.), and the *Polyodontidæ,* or paddle-fishes (q.v.).

Chondrus, kŏn'drŭs, the genus of seaweeds to which carrageen or Irish moss belongs.

Chonos (chō'nōs) **Archipelago,** or **Guaytecas Islands,** a group of islands belonging to the Chilean province of Chiloe, lying off the west coast of Patagonia, mostly between lats. 44° and 46° S., and lon. 74° and 75° W. Two are large, but they are all barren and scantily inhabited. Magdalena is the largest island.

Chop-sticks (Chinese, *kwai-tsz,* "nimble or diligent lads"), two smooth sticks, about the thickness of a quill, of bamboo, wood, or ivory, which are used by the Chinese for conveying meat or vegetables, particularly rice, to the mouth. The chop-sticks are used in various manners, serving partially the purposes of a fork and a spoon. The most curious mode of using the chop-sticks is when a bowl of rice is brought close to the lips, the mouth held wide open, and the grain dexterously dashed into it with the chop-sticks, held one on each side of the forefinger, and plied with a rapid motion quite suggestive of the Chinese title.

Chopin, Frédéric François, frā'dē rĭk frăn swä shō-păn, Polish musical composer and pianist: b. Zelazowa-Wola, near Warsaw, 1 March 1809; d. Paris 17 Oct. 1849. His father was a Frenchman and his mother a Pole. After studying music in Warsaw he traveled through various cities of Germany and Austria, and finally settled in Paris in 1831. Here he became celebrated as a virtuoso and composer, and made the acquaintance of Liszt, George Sand, Berlioz, and other well-known persons. In 1837 and in 1848, he visited England, and in the latter year he also played in Edinburgh and Glasgow. He wrote numerous pieces for the pianoforte, of which he was called the poet, but he seldom composed for the orchestra. His music is largely based on various Slavonic rhythms. His mazurkas first introduced this style of music into France. His works include 19 nocturnes, 52 mazurkas, 27 études, 3 sonatas, 25 preludes, 13 waltzes, 12 polonaises, 5 rondos, 4 scherzos, 4 ballades, 4 fantaisies, a funeral march, several songs, etc. He united bold innovations with a classical style. See Karasowski, 'Frédéric Chopin,' English translation (1879); Liszt, 'Life of Chopin,' English translation (1877); Finck, 'Chopin and Other Musical Essays' (1889); Niecks, 'Chopin as Man and Musician' (1889); 'Life,' by Villeby (1892); Hunneker, 'Chopin: the Man and His Music' (1900).

Chopin, shō-păn, **Kate O'Flaherty,** American writer: b. St. Louis, Mo., 8 Feb. 1851; married Oscar Chopin, a New Orleans cotton factor, in 1870. Since his death she has lived in her native city. She has published 'At Fault' (1891); 'Bayou Folk' (1894); 'A Night in Acadie' (1897); 'The Awakening' (1899).

Chopin, chŏp'ĭn, a Scotch liquid measure containing two imperial pints. The chopin, in name at least, was derived from the French, with whom a similar measure was in use till the introduction of the metric system. The French *chopine* was not a uniform measure, but varied according to localities. That of Paris was a little over four fifths of an imperial pint.

Chopine, chō-pēn', an elevated shoe or clog, introduced into England from Venice in the reign of Queen Elizabeth, and which became the fashionable wear of court ladies during that reign. The Venetian chopines were made of wood covered with leather of sundry colors, white, red, yellow, and sometimes gilt. Some were of great height, the height of the chopine being regarded as a mark of the rank of the wearer. To such a degree of extravagance was this carried that women of rank could not walk without being supported. This silly fashion does not seem to have been carried to the same excess in England. Hamlet (act ii., scene 2) addresses one of the players, "Your ladyship is nearer to heaven than when I saw you last by the altitude of a chopine."

Chop'tank River rises in Kent County, Del., flows southwest into Maryland, and near the south extremity of Talbot County spreads into an estuary several miles wide and nearly 20 miles long, through which it empties into Chesapeake Bay; total course, 100 miles. It is navigable for sloops to the mouth of Tuckahoe River, a distance of about 50 miles.

Chopunnish, chō-pŭn'ĭsh, or **Nez Percé,** a tribe of North American Indians, also known as Nimapu, or Sahaptin, the principal tribe of the Sahaptian confederation, who now live on the Nez Percé reservation, in Idaho, and number 1,515. The name Nez Percé originated from the custom formerly followed of piercing the

nose. In the Nez Percé war the tribe was under the control of Chief Joseph, who forbade his men to interfere with any white non-combatants. See SAHAPTIAN INDIANS.

Choragic (kō-răj'ĭk) **Monument,** in ancient Greece, a monument erected in honor of one who had gained a prize as "choragus," or organizer of the play and chorus. The remains of two very fine monuments of this sort are still to be seen at Athens, namely, those of Thrasyllus and of Lysicrates, the last popularly called the Lantern of Demosthenes.

Choragus, kō-rā'gŭs, or **Choregus,** among the ancient Greeks, the musician who directed each of the choruses furnished by the 10 Attic tribes for the public festivals; also the citizens who defrayed the expense of each chorus. The person of the choragus was inviolable, as well as those of the members of the chorus. The choragus who was adjudged to have performed his duty best received an ornamental tripod, engraved by a skilful artist, and bearing the name of the tribe which had gained the victory, of the citizen who had paid the expense, and of the master who had trained the choir. These tripods were set up as public monuments on pillars or other structures. A street in Athens which contained a great number of such monuments was called the Street of the Tripods. The most remarkable of these monuments yet remaining is the choragic monument of Lysicrates. See CHORAGIC MONUMENT; CHORUS.

Cho'ral Service, a service with intoned responses, and the use of music throughout wherever it is authorized. The service is said to be partly choral when only canticles, hymns, etc., are sung; wholly choral, when, in addition to these, the versicles, responses, etc., are sung.

Choral Societies. A choral society is a body of amateur singers formed for the purpose of studying and performing large choral works. Formerly all chorus singers were professional musicians, and the chorus that took part in the production of an oratorio did not usually number over 40, while the orchestra was frequently larger than this.

To-day all choral societies consist of amateurs and are much larger than their professional predecessors, while the orchestra is only slightly increased in size. An average chorus numbers 150 to 200 voices, while the orchestra varies from 35 to 60 men. It is possible that the magnificent effect of the chorus formed to celebrate the centenary of Handel's birth by performances given in Westminster Abbey and the Pantheon in London in 1784 may have been a great factor in the formation of choral societies in England. This chorus was the largest that had ever been formed up to that time. It numbered 274 and the orchestra 251. At a subsequent festival in 1791 the chorus and orchestra were said to have numbered over 1,000, while for the Handel Festival held in the Crystal Palace in London in 1874 the chorus numbered 3,200 and the orchestra over 500.

It is very doubtful, however, whether such a large body of singers and players is very materially more effective than a smaller one. The impression on first hearing an enormous chorus is nearly always one of disappointment at the volume of sound. The explanation is made that the large hall necessary for such a large chorus and audience causes a loss of quantity of tone, but this is disproved by comparisons made at a Saengerfest held in Philadelphia, Pa. Here the effect of the entire mass chorus of 5,000 male voices was not much greater than that of a single society of 250 voices. There was a difference, of course, but the volume was not 20 times greater, not even twice as great.

A well-balanced chorus of from 200 to 500 voices is now generally acknowledged to be more effective and much easier to command than the overgrown chorus gotten together for a festival. Choruses of this size are very numerous in the United States, Germany, and England, where choral work, both religious and secular, is highly appreciated and supported; it is remarkable that France and Italy, both musical countries and more devoted to vocal than to instrumental music, do not cultivate choral music more generally. Even Berlioz in writing out his list of an ideal musical force to have at command makes his orchestra almost equal in numbers with his chorus, showing that he had a professional chorus in mind, and that therefore in his time (died 1869) a choral society of amateurs was perhaps unknown.

The Berlin Singakademie, still in existence and world renowned, was the first permanent choral society. Founded in 1791 with 27 members it now numbers 600. Mendelssohn was at one time its conductor.

In the United States the first choral society was the Stoughton (Mass.) Musical Society (1786), the outgrowth of a "sacred singing school" founded in 1724. The Handel and Haydn of Boston (1815) was of much greater importance, however, and is to-day one of the most important choral societies in the New World. Until 1847 the president of the society was its conductor, but with the increase of musical ability and criticism it was felt that the time-honored custom would have to be given up. Under Bergman (1852) and Zerrahn (1854) it increased in numbers and ability. Within the last few years under Mollenhauer (1901) a thorough reorganization took place and the society has recovered the position which it had to some extent lost.

The Cecilia Society, founded in 1900, under the direction of B. J. Lang, has done good work in the field of choral music.

In New York a number of choral societies, the Handel and Haydn, the New York Choral Society and the New York Sacred Music Society, dating from 1819 to 1849, fostered the taste for choral music. After this for more than 20 years no long-continued effort was made to carry on the work, until in 1873 Dr. Leopold Damrosch founded the Oratorio Society which, beginning with about 50 members, now numbers nearly 300. Walter Damrosch, son of Dr. Leopold Damrosch, succeeded him as conductor, and Frank Damrosch, another son, is the present conductor. The latter is also conductor of the Musical Art Society, devoted to the performance of older church music, and the People's Choral Union of 2,000 voices drawn from the laboring classes.

Philadelphia has had several notable choral societies, the Handel and Haydn, the Beethoven, the Cecilian and the Philadelphia Chorus, conducted by Henry G. Thunder, Michael H. Cross, Chas. M. Schmitz, and W. W. Gilchrist. These have all passed away, but in their stead is a new and vigorous chorus of 300 voices, founded in

1897 and conducted by Henry Gordon Thunder, son of Henry G. Thunder.

In Baltimore the Oratorio Society under Pache, and in Washington the Choral Society under Kaspar, are presenting standard works in an adequate manner.

In Chicago the Apollo Club (1872) under Harrison M. Wild, and in St. Louis the Choral Symphony Society (1870) under Ernst, are bending public taste toward the great choral works.

While the giving of music festivals involves the forming of a large chorus in conjunction with orchestra and soloists, it does not appear that such bodies of voices are appropriately styled choral societies in the strict sense; hence only passing mention is here made of the Springfield, Worcester, and Cincinnati festivals, all of which have large and efficient choruses conducted by Chadwick, Goodrich, and Theodore Thomas.

A difference, however, must be made between these choruses and the Bach Choir of Bethlehem, Pa. This unique organization of about 100 voices under the direction of J. Fred Wolle has devoted itself to the presentation of the works of John Sebastian Bach, and in the three festivals held in 1900, 1901, and 1903 has achieved a national reputation for itself. It produced the great Mass in B minor for the first time in America, besides giving the Matthew Passion, the Christmas Oratorio and other works in a most impressive manner. To some extent this was no doubt due to the unusual and reverential surroundings, the old Moravian town, the venerable church in which the performances were held, the announcement of the performance by a choir of trombones in the belfry. All these details no doubt helped greatly to create an atmosphere of simplicity and sincerity that affected the audiences that gathered from far and wide, but the real effect was the chorus work, which was done with an earnestness and devotion that were most impressive and caused the often inadequate solo and orchestra work to be forgotten.

HENRY GORDON THUNDER.
Conductor Philadelphia Chorus.

Cho'rale, a musical term borrowed from the German. It signifies a simple melody set in parts to be sung in harmony by a number of voices to sacred words, usually in public worship: a psalm tune. In Germany the chorale is frequently sung in unison. This was the ancient practice, adopted before the laws of harmony were well understood.

Chorazin, kō-rā'zĭn, Palestine, one of the cities in which Christ's mighty works were done, but named only in his denunciation (Matt. xi. 21; Luke x. 13). It was known to St. Jerome, who describes it as on the shore of the lake, two miles from Capernaum. Robinson locates it at the modern Tell-hûn, three miles northeast of Capernaum, but this location is doubtful.

Chord, (from the Greek word *chordē,* a string of gut). 1. In music, the simultaneous and harmonious union of different sounds, at first intuitively recognized by the ear, and afterward reduced to a science by the invention of the laws or rules of harmony. Chords may consist of from two to five parts. Absolute chords of two parts are produced only by thirds or sevenths. Chords of more than two parts are either fundamental chords or inversions of them, and are divided into concords and discords. The union of sounds in all chords will be found, on analyzing their component parts, to be an admixture of major and minor thirds. The common chord of *Trias harmonica perfecta,* is the basis of all harmony, and consists of a base note, or prime, with its third and fifth above. These three sounds are the distance of a third from each other. When the lowest third is the greater third, as above, the chord is a major chord; but when the lowest third is the lesser, the chord is called a minor chord. A chord of two minor thirds combined is called diminished, as the interval from the lowest note to the highest is less than a perfect fifth, the common chord admits of two inversions, according as one or other of its notes is made the base, or lowest note of the chord.

By adding another third above the common chord, a chord of four parts is produced, which is called the chord of the seventh, because the highest note is a seventh above the bass. When the chord of the seventh is produced on the fifth of the scale it is then called the dominant seventh, which is the most perfect species of the chord. It then consists of a major third, perfect fifth, and seventh, the minor, which is the next harmonic produced by nature above the fifth. The chord of the seventh may be formed also on any of the notes of the major or minor scale taken as a bass note, which produces the varieties of major, minor, and diminished seventh. The chord of the seventh admits of three inversions, according as the notes above the fundamental note are used as bass notes. From its nature, it requires a resolution, and is therefore always followed by a common chord, whose fundamental bass is a fifth below that of the seventh.

2. In geometry, a chord is the straight line which joins the two extremities of the arc of a curve; so called from the resemblance which the arc and chord together have to a bow and its string, the chord representing the string. The chord of a circular arc is obtained by multiplying the radius by twice the sine of half the angle which the arc subtends at the centre.

Chordata, kôr-dā'ta, the most advanced in development of the phyla, or branches, of the animal kingdom, the phylum which is characterized by the presence of a notochord (q.v.), and in its higher classes by the presence of a backbone and spinal cord. It includes all the vertebrates (mammals, birds, amphibians, reptiles, and fishes), and also *Amphioxus,* the ascidians, and *Balanoglossus* (qq.v.). Compare ADELOCHORDA.

Chorea, or **St. Vitus' Dance,** an acute convulsive disorder of childhood, characterized by sudden onset, irregular convulsive, non-rhythmical movements of the limbs or of the body and by a recovery usually spontaneous. There are many diverse conditions that have been called chorea in the past. There are strong reasons to believe that true chorea, however, is due to the action of some micro-organism; and, in view of the close relation it bears to rheumatic invasions in the same individual, the inference has been drawn by many serious students that chorea is a toxic disorder due probably to the same organism that causes acute articular rheumatism (Poynton & Payne). It occurs most frequently in the spring months,

in children from 5 to 15 years of age, and a nervous temperament seems necessary. The symptoms may be very slight, consisting of a grimace, or a sudden movement of the arms, causing the patient to drop anything held in the hands at the time. Or it may involve a large part of the musculature, especially the muscles of the extremities. It is non-symmetrical, the movements are sudden and jerky and non-purposeful, not representing any usual coordinated muscular act; hence the difficulty there is in imitating the movements. The attacks may begin in a few muscles, remain there, or spread widely. There may be slight or grave constitutional disturbances; some patients even die, although death is not a usual result in this country. In England, where rheumatic disorders seem to be more common, the disease seems to be more prevalent and more severe. The usual course of the disease is from four weeks to three months, but it may persist longer and even become chronic, although the chronic cases are probable forms of spasmodic tics. Treatment is very satisfactory. Rest, open air, nutritious diet, and some form of arsenic, are the general lines of treatment. Medical assistance is imperative, however, in view of the possible existence of heart lesions and other grave accompaniments of this affection. For hereditary chorea see HUNTINGDON'S DISEASE.

Chorion, kō'rĭ-on, the outermost of the membranes that surround the embryo. It is a most important structure in its developmental history as it comes into close contact with the decidua and is incorporated into the placenta, constituting the fœtal part.

Chorley, chôr'lĭ, **Henry Fothergill,** English critic and miscellaneous writer: b. Blackley Hurst, Lancashire, 15 Dec. 1808; d. London 15 Feb. 1872. His criticisms appeared mostly in the 'Athenæum' of London, displaying fine perception and exquisite taste in matters connected with literature and music. His novels, however ('Conti'; 'The Prodigy'; and 'The Lion'), are failures from the popular point of view, although finely written; and his plays, with the exception of 'Old Love and New Fortune,' are weak.

Chorley, a municipal borough and market town of England, in Lancashire, on the Chor, 20 miles northwest of Manchester. It consists of spacious well-built streets, and contains an ancient parish church, various other churches and chapels of modern date, together with a spacious town-hall, several large schools, club-houses, theatres, etc. The principal manufacture is that of cotton goods, but there are also bleaching, calico-printing, and dye-wood works, floor-cloth works, and iron foundries. In the vicinity are coal, lead, and iron mines, and millstone quarries. Pop. (1901) 26,850.

Choron, Alexandre Étienne, ä-lĕks-ändr ä-tē-ĕn shō-rôn, French musician: b. Caen 21 Oct. 1772; d. Paris 29 June 1834. He labored assiduously to promote musical education in France, founding his famous "Conservatory" in 1818. He wrote 'Principes de Composition des écoles d' Italie' (1808), and other valuable textbooks on music.

Cho'rus, originally a special feature in the Greek drama. During the most flourishing period of Attic tragedy the chorus was a troop of male performers, wearing masks, and representing male or female characters, who, during the whole representation, were spectators of the action. In the intervals of the action the chorus chanted songs, which related to the subject of the performance, and were intended either to augment the impression or to express the feeling of the audience on the course of the action. Sometimes it even took a direct part in the action by observations on the conduct of the dramatic characters, by advice, consolation, exhortation, or dissuasion. It usually represented a part, generally the oldest portion of the people, where the action happened, sometimes the counselors of the king, etc. The chorus was an indispensable part of the representation. In the beginning it consisted of a great number of persons, sometimes as many as 50; but the number of the tragic chorus was afterward limited to 15; while the chorus in comedy numbered 24. The exhibition of a chorus was in Athens an honorable civil charge, and was called choragy. (See CHORAGUS.) The leader or chief of a chorus was called coryphæus, who spoke in the name of the rest when the chorus participated in the action. The chorus was often divided into two parts, who sung alternately. The divisions of the chorus were not stationary, but moved from one side of the stage to the other; from which circumstance the names of the portions of verse which they recited, *strophe, anti-strophe,* and *epode,* are derived. But it cannot be determined in what manner the chorus sung. It is probable that it was in a sort of solemn recitative, and that their melodies, if we may call them so, consisted in unisons and octaves, and were very simple. They were accompanied by flutes. With the decline of ancient tragedy the chorus was omitted. Some modern tragedians, as Racine in France and Schiller in Germany, have attempted, with more or less success, to imitate or revive the Greek chorus. Shakespeare has employed devices founded on it.

Chorus, in modern music, is that part of a composite vocal performance which is executed by the whole body of the singers, in contradistinction to the solo airs and concerted pieces for selected voices. The singers themselves are also called the chorus.

Chose, shōz, a thing, a chattel, a piece of property; the subject-matter of an action. Chose is used in divers senses, of which the four following are the most important: Chose local, a thing annexed to a place, as a mill; chose transitory, that which is movable, and may be taken away or carried from place to place; chose in action, otherwise called chose in suspense, a thing of which a man has not the possession or actual enjoyment, but has a right to demand by action or other proceeding; chose in possession, a thing which a person has not only the right to enjoy, but also its actual enjoyment.

Chosroes (kŏs'rō-ēz) **I.,** King of Persia: d. 579. He succeeded to the throne in 531, and his memory is still venerated in the East, where his virtues obtained him the titles of the Magnanimous and the Just. At his accession Persia was involved in a war with Justinian, which Chosroes terminated successfully, obliging Justinian to purchase peace by the payment of a large sum of money. In 540, however, jealous of the victories of Belisarius, the great general

of the empire, Chosroes violated the peace, invaded Syria, laid Antioch in ashes, and returned home laden with spoils. The war continued till 562, when the emperor again purchased peace by an annual tribute of 30,000 pieces of gold. The peace continued for 10 years, when the war was renewed with Justin, the successor of Justinian, when Chosroes was again successful. His zeal for the administration of justice sometimes led him to acts of cruelty; but he encouraged the arts, founded academies, and made a considerable proficiency in philosophy himself. His reputation obtained him a visit from seven sages of Greece, who still adhered to the Pagan religion; and in a treaty with Justinian he required that they should be exempt from the penalties enacted against those who continued to favor Paganism. It was in the reign of Chosroes that the Turks first became known to Europeans, first as friends, afterward as enemies, of the Persian king.

Chosroes II., king of Persia, grandson of the preceding. He ascended the throne in 591, on the deposition of his father. He was assisted by the Emperor Mauricius, and on the assassination of the latter by Phocas (602) he took up arms against the empire, and refused to make peace at the solicitation of Heraclius, the succeeding emperor. By a long series of successes he raised the Persian power to the highest point, and reduced the empire to extremity. Heraclius, however, taking courage from despair, succeeded in a series of brilliant campaigns in recovering his lost provinces, 622–7. Chosroes, repeatedly defeated, was completely overthrown in the great battle of Nineveh. He fled with his favorite wife Sira, but after witnessing the massacre of his numerous sons he was thrown into a dungeon and assassinated by command of his son Siroes.

Chota Nagpur, or **Chota Nagpore,** chō ṭa năg-poor′, British India, a division of Bengal, a commissionership which is divided into the districts of Lohardaga, Hazaribagh, Singbhum, Palamau, and Manbhum; area 26,966 square miles. It consists for the most part of an undulating plateau about 3,000 feet above the sea, and rising occasionally into ridges of hills which stretch from east to west. The drainage is received chiefly by numerous tributaries of the Subarna-rekha in the northeast, and by the north and south Coel and other streams in the south and west. Much of the surface is overrun with jungle, or covered with forests containing teak and other kinds of valuable timber. The soil in the plains consists of a red loam, and where under cultivation, produces excellent crops of wheat, barley, rice, pulse, cotton, and sugarcane. Coal occurs in various localities, and is worked in the Karharbari coal-fields in Hazaribagh. The trade, hampered by imperfect means of conveyance, is limited, and is nearly confined to grain, lac, coarse silk, oil-seeds, and other agricultural products. Pop. (1891) 4,628,792.

Chouans, shoo-äṅ, a name given to the royalist peasantry of Brittany and lower Maine, who carried on a petty warfare against the republican government from an early period of the French Revolution. The name Chouan was finally extended to all the Vendeans. The name was derived from the first chief of the Chouans, Jean Cottereau, who with his three brothers organized these bands in 1792, under the inspiration of the Marquis de la Rouaric, an ardent leader of the Royalists. Cottereau was the son and grandson of persons engaged in the manufacture of wooden shoes. He had joined a band of dealers in contraband salt, and acquired the surname Chouan from the cry of the screech-owl (*chat-huant*), which he used as a signal with his companions. He was killed in an engagement with the Republican troops, 28 July 1794. After the death of Jean Cottereau, the Chouans became quite lawless, engaging in guerrilla warfare and highway robbery. About 1800 they ceased to rob and terrorize, and, although, in 1815 an effort was made to revive the insurrection, they were suppressed by Gen. La Marque.

Chouans, The, a romance by Balzac, the novelist's first important work. The title, when it appeared in 1829, was 'The Last Chouan; or, Bretagne in 1800.' In 1846 it was rearranged in its present form. The author made a profound study of the scenery of Bretagne, and the manners of its people, before he wrote his romance; and his pictures of both scenery and people have the stamp of reality and truth.

Chough, chŭf, a bird (*Fregilus graculus*), belonging to the sub-order *Fregilinæ* of the crow family, and particularly the Cornish chough. The name is derived from the cawing of the bird. It is widely distributed over Europe, India, and northern Africa, living in great colonies in the faces of precipitous cliffs. The bill is long and slightly curved; feathers black; the claws long and hooked, enabling it to cling to the slight projections of rocks and stone walls. It is often tamed and kept as a household pet, but is now disappearing, giving place to the jackdaw.

Chousinga, chow'sĭn-gą, a gazelle-like Indian antelope, remarkable for the fact that the buck has four horns. See FOUR-HORNED ANTELOPE.

Chouteau, shoo-tō, **Auguste,** American pioneer: b. New Orleans, La., 1739; d. St. Louis., Mo., 24 Feb. 1829. He was from his early youth a fur trader, and in 1763 set out with his brother Pierre Chouteau (q.v.) to establish trading stations in the regions west of the Mississippi. On this trip they founded the city of St. Louis in 1764.

Chouteau, Pierre, pē-ār, American pioneer: b. New Orleans 1749; d. St. Louis 9 July 1849. He had few early advantages, but, becoming a fur trader, decided, in 1763, to extend his operations to the region beyond the Mississippi. With his brother, Auguste, he set out in 1763, joining a government expedition. He stopped in the heart of an unsettled country and founded, with his brother, the city of St. Louis.

Chouteau, Pierre, Jr., American fur trader, son of the preceding: b. St. Louis 19 Jan. 1789; d. St. Louis 8 Sept. 1865. He worked for his father and began trading in fur early in life. After establishing posts for the sale of skins throughout the trans-Mississippi region he purchased the fur-trading interests of John Jacob Astor.

Chowchow, a diminutive breed of Siberian sledge-dogs, improved and developed in China, whence they began to be imported into Europe and America at the beginning of the 20th cen-

tury. These dogs have the form and coat of their useful progenitors, and are very compact and sturdy of frame, and lively in disposition. The tail is carried tightly curled over the back. In color they are either all black, even to the tongue and inside of the mouth, or all white, blue, red, or yellow. This breed was not recognized in American bench-shows until 1902.

Chow-chow, a Chinese or pidgin English word meaning chopped up or broken and mixed. It is applied to a confection of mixed fruits made in China; to a mustard pickle of assorted ingredients made in India; and in the United States and Great Britain to a similar pickle usually compounded of chopped cabbage, green tomatoes, green or red peppers, spices, vinegar, mustard-seed, cucumbers, etc.

Chow'der (French *chaudière,* "a kettle"), a dish of French origin, composed chiefly of vegetables, pork, and fish or shell-fish, boiled together. Perhaps the most common form of chowder is that made from clams, either from the soft-shelled variety or the hard-shelled round clam or quahog. Chowder is a favorite dish on the New England coast and among the Newfoundland fishermen. A fish chowder is made as follows: Salt pork cut into small strips or dice is cooked for a few minutes in a deep iron kettle. Sliced or chopped onions are slightly browned in the pork fat, and onions and pork are then removed. A layer of sliced potatoes is laid in the kettle, then a layer of fish (small ones entire or large fish in slices), a layer of salt pork, one of onions, and so on alternately to the requisite amount. The fried salt pork and onions are also distributed through the mass, which should be seasoned throughout with salt, pepper, thyme, and savory. A very common ingredient is ship-bread or other hard crackers laid in between the other layers. A small quantity of water or of milk, or of both, is poured into the kettle, and the whole is boiled, without stirring, until cooked through. In adding the water or milk it must be remembered that chowder is a stew,— not a soup. Foreign cooks make a soup of clams, potatoes, onions, and tomatoes, which passes under the name of clam chowder. Genuine chowder is never disturbed until it is served, and in camps is portioned out, in layers, direct from the kettle.

Chrétien de Troyes, krā-tē-ĕn dė trwä, French trouvère: b. Troyes about 1150; d. about the end of the 12th or beginning of the 13th century. He translated Ovid's 'Ars Amandi' into French, and probably wrote some works based on the classics, but his fame rests upon the still extant romances of Arthur and the Knights of the Round Table, the materials for which were obtained from Geoffrey of Monmouth's rather credulous 'History of Britain.' They are entitled 'Iric et Guide'; 'Perceval le Gallois'; 'Le Chevalier au Lion'; 'Cliget'; 'Chevalier de la Table Ronde'; 'Lancelot du Lac'; and 'Guillaume d'Angleterre'; but the authorship of the last named is doubtful. Other two of his works, 'Tristan, ou le Roi Marc et la Reine Yseult' and 'Le Chevalier à l'Épée,' have been apparently lost. His language and versification were models for troubadours and romancers for a long time; and from him the Arthurian poets to the end of the 13th century borrowed episodes, themes, situations, characters, and all manner of poet's devices. Chrétien was a master of invention, fashioned for himself a competent literary vehicle, and made most effective use of his large knowledge of men and manners. See Förster, 'Christian von Troyes sammtliche erhaltene Werke' (1884).

Chriemhild, krēm-hĭlt. See KRIEMHILD.

Chrism, krĭzm, a mixture of olive oil with balm (*opobalsamum*), which, being blessed by the bishop, is used in the Roman Catholic Church in the administration of the sacraments of baptism, confirmation, holy orders, and extreme unction, and in certain rites; as in consecrating the instruments of the divine service, as the sacred vessels, church edifices, altar stones. The chrism of the Greek Church is compounded of olive oil and a great variety of spices. In the Roman Catholic Church the holy oils are blessed by the bishop on the Thursday of Holy Week.

Chrisom, krĭz'ŏm, the name of the white linen cloth laid by the priest on the child in Roman Catholic baptism, to signify its innocence. By olden usage it was generally presented by the mother as an offering to the Church, but if the child died before the mother was churched, it was used as a shroud. By a common abuse of words, Chrisom came to mean the child itself, being first applied in the old bills of mortality to denote such children as died within the month of birth.

Christ (Greek *Christos,* the anointed; *Messiah,* from the Hebrew, has the same signification). See CHRISTIANITY; JESUS.

Christ, Disciples of, a denomination of Christians in the United States commonly known as the Christian Church, or Church of Christ, and sometimes called Campbellites. In September 1809, Thomas Campbell, a Scotch minister of the seceders' branch of the Presbyterian Church, then living in western Pennsylvania, issued a "Declaration and Address," deploring the divided state of the Church, and urging as the only remedy a complete restoration of apostolic Christianity and the rejection of all human creeds and confessions of faith. The Christian Association of Washington, Pa., was formed for the purpose of promoting the principles set forth in this declaration. Mr. Campbell's son, Alexander, just from Glasgow University, Scotland, at once gave his splendid ability and learning to this new movement. It was not the intention of the Campbells to form a distinct religious body, but to effect the proposed reforms in the churches. Their plea was so opposed that they were compelled to act independently, and the first church in the new movement was organized at Brush Run on 4 May 1811. The Disciples maintained that having accepted the Bible as their only rule of faith and practice, and the only divine basis for the union of all Christians, they were led to reject infant baptism and adopt believers' immersion only. They observe the Lord's Supper each first day of the week, and heartily and practically accept and exalt the doctrine of the divinity of Christ. Their church policy is congregational, though they frequently hold conventions in the interest of world-wide missions, but not for legislative purposes. In 1900 the denomination had 6,528 ministers, 10,528 churches, and 1,149,982 communicants, besides

several universities and colleges of high rank, and a number of religious publications.

Christ, or **Criss-Cross Row.** See HORN-BOOK.

Christ in Art. The representations of the person of the Saviour which for a succession of ages have constituted one of the most important subjects of Christian art, and have occupied the highest genius, especially of Roman Catholic artists, are all evidently ideal. The attempt to represent the personal appearance of the Saviour can hardly be traced back further than the age of Constantine. The origin of Christian art, indeed, has been traced successfully to the catacombs of Rome, and is not to be considered as springing directly from Pagan art, although the great Italian masters of the Middle Ages may have derived much instruction from classical models; but the painting and sculpture of the early Christians were chiefly allegorical, representing the moral of the gospel parables, or similar symbolic representations of Christian doctrine, without regard to historical accuracy of portraiture. At a later period legends were invented of various likenesses of the Saviour having been preserved by miraculous or other remarkable means, but these stories are intrinsically weak and improbable, and are entirely destitute of external evidence. They are of such a nature as that King Abgarus of Edessa had a napkin sent him by the Saviour himself, in which he had caused his likeness to be miraculously impressed by placing his face in it. A portrait is said to have been similarly impressed on a handkerchief of St. Veronica, and St. Luke is said to have taken one himself. An apocryphal letter of Lentulus, the predecessor of Pilate, addressed to the Roman senate, contains a description of the person of Jesus. One of the earliest professed portraits of the Saviour is in the Calixtine Catacomb near Rome. He is represented with the hair parted on the forehead, and falling over the shoulders in long waving locks. In regard to this common notion it may be observed that when St. Paul wrote his first epistle to the Corinthians there were probably many Christians scattered over the world who remembered the personal appearance of the Saviour, and if this representation of it had been correct he would hardly have written to a Christian church that it was contrary to nature and a shame for a man to have long hair. The great painters of the Middle Ages, to whom we owe the ideal representation of Christ which has now become common in symbolical paintings, probably founded somewhat upon these early notions. A Christ of the 4th century with an oval face, Oriental features, parted hair, and a short straight beard, is said to have been the model of the Byzantine and Italian painters till the time of Michael Angelo and Raphael.

Christ, Order of, on the abolition of the Templars by Clement V., in 1312, King Dionysius of Portugal preserved the order in his dominions, but changed its title to that of The Knights of Christ, or The Order of Our Lord Jesus Christ. This arrangement was sanctioned by Pope John XXI. or XXII., in 1319. The seat of the order was transferred from Castro-Marino to Thomar in 1366. The new order afterward attained such power that King John III. was obliged to obtain an edict from Pope Hadrian VI., in 1522, by which the grand-mastership of the order became vested in the kings of Portugal.

Christ Church, College of, a notable institution in Oxford, England. In 1526 Wolsey obtained from Clement VII. a bull for the suppression of 22 monasteries, the site of one of which he chose for a new college, to be called Cardinal College, and which he intended to endow beyond that of any other in Oxford. On the fall of Wolsey, in 1529, the establishment came into the hands of King Henry VIII. In 1532 that prince founded it under the name of King Henry VIII.'s College, and in 1546 he once more re-established the college under the name of "Christ Church Cathedral in Oxford, or the Foundation of King Henry VIII., with a dean and canons, 60 students, 40 schoolboys, clerks, choristers," etc. The foundation is now subsisting, though it has undergone considerable modifications. According to the present statutes, which came into force in 1882, the students, who are equivalent to fellows, are divided into two classes, and are in number about 30, besides honorary students. There is also a body of scholars, over 40 in number, some of whom are elected annually from Westminster School, while others are chosen by open competition for proficiency in mathematics, physical science, or history. The students are appointed in the first instance for two years, but this term may be prolonged. There are also many exhibitioners.

Christadel'phians, a religious body that originated during the American Civil War, their founder being Dr. J. Thomas. They believe that God will raise all who love him to an endless life in this world, but that those who do not shall absolutely perish in death; that Christ is the Son of God, inheriting moral perfection from the Deity, our human nature from his mother; and that there is no personal devil Their chief newspaper in Great Britain is *The Christadelphian*, published in Birmingham. The works of Dr. Thomas and 'Christendom Astray' by Robert Roberts contain expositions of their religious views.

Christ'church, England, municipal borough in Hampshire, situated at the confluence of the Avon and Stour, about one mile from the sea. It is famous for its great priory church, dating in part from the early part of the 12th century. The church is over 300 feet long and contains a magnificent altar-screen. Fusee chains for watches used to be manufactured in Christchurch. Pop. (1901) 4,204.

Christchurch, New Zealand, a town, capital of the province of Canterbury, and the see of the primate of New Zealand, situated on the Avon River, seven miles from the sea, and is the terminus of the Great Northern and Southern Railway. A railway tunneled through the Lyttelton Hills connects it with Lyttelton, the nearest port. It contains a number of handsome buildings, including a fine cathedral, the government offices, St. Michael's church, the supreme court, hospital, museum, town library, lunatic asylum, convent, theatre, banks, clubhouse, and college, and has a flourishing trade and manufactures. Pop. (1901) 57,041.

Christen, krē'stĕn, **Ada.** See BREDEN, CHRISTINE.

Christian I., king of Denmark and Norway: b. 1426; d. Copenhagen 21 May 1481. He reigned from 1448 to 1481, and in 1479 founded the University of Denmark.

Christian II., king of Denmark, Norway and Sweden: b. Nyborg, Fünen, 2 July 1481; d. Kallundborg, Zealand, 25 Jan. 1559. He was grandson of Christian I. In 1501 he was named successor to the crown, and took part in the government of Norway, which he conducted with great severity.

On his accession to the throne in 1513 he signed a capitulation in favor of the privileges of the lay and clerical aristocracy in his dominions, including the independent administration of justice; but all his efforts were bent toward strengthening the royal power, particularly in Sweden, which refused to acknowledge him. To strengthen himself against Steen Sture, the administrator of Sweden, who had set himself in opposition to the union of Calmar formed in 1397 between Norway, Sweden, and Denmark, he married Isabella, sister of Charles V. of Germany, in 1515. He had already a mistress called Dyveke, the daughter of a Dutch woman who kept an inn in Bergen, Norway. She exercised a great influence over the king, and by her liberal spirit and knowledge of the institutions of Holland tended greatly to improve the administration of his government. She became a sort of prime minister, and had great influence in originating those wise laws which gained for this king the love of his subjects. But she incurred the hatred of the nobility, and in 1517 died of poison.

Soon after war broke out with Sweden, and making all the preparations and alliances in his power, Christian sent an army into Sweden commanded by Otto Krumpen, who defeated the Swedes in the decisive battle of Bogesund (Ulrikehamn), 19 Jan. 1520, in which Steen Sture, the administrator, was killed. Stockholm, under the command of the widow of Sture, stood a siege of four months, and on 4 November, Christian was crowned king of Sweden.

Subsequently Sweden revolted under Gustavus Vasa, who had expelled the Danish garrisons and been proclaimed administrator. To find the means of defense Christian convoked the Diet toward the close of 1522. Instead of attending it the nobles and prelates assembled at Wiborg in Jutland, proclaimed the deposition of Christian, and called his uncle, Frederick, to the throne. Christian fled to the Netherlands to claim the succor of his brother-in-law, Charles V. Gustavus, already master of Sweden, put an end to the union of Calmar in 1523, and was proclaimed king. Christian remained nine years in exile without obtaining aid from Charles, and then visited England and Germany, and adopted the Reformed faith. At length, with the assistance of Charles, he equipped a fleet in Holland, landed in Norway in 1531, and was proclaimed king by the Norwegian Diet, which had refused to recognize Frederick. The commander of the Danish fleet, a bishop, having offered him a safe conduct, he repaired to Copenhagen to negotiate with Frederick, who disavowed the admiral, and retained him prisoner. He was confined for 12 years in the Castle of Sonderburg, island of Alsen, in a dungeon of which the door was walled up, the only access being by the window, and his only attendant a Norwegian dwarf. In 1544 Christian III. somewhat relaxed the rigor of his confinement, and in 1549, on renouncing his right to the crown, he was permitted to reside in the Castle of Kallundborg in Zealand, where he was subjected to a less severe surveillance, until his death in 1559. His misfortunes were chiefly due to the enmity excited by his reforms, and his violation of the capitulation entered into at his coronation. See Behrmann, 'Kong Christiern II., Historie' (1815).

Christian III., king of Denmark and Norway: b. 1502; d. Kolding, Denmark, 1 Jan. 1559. He succeeded his father, Frederic I., and introduced the Reformed faith into Norway and Denmark. In his reign Norway was reduced to the status of a province.

Christian IV., king of Denmark: b. Frederiksburg, Zealand, 12 April 1577; d. Copenhagen 28 Feb. 1648. He was the son of Frederick II. and succeeded to the throne as a minor in 1588. He early gave numerous proofs of a sincere love of religion and justice, and a high esteem for science and art. He made his celebrated voyage to the North Cape to learn the boundaries of his kingdom and protect the rights of his subjects in that remote region from any foreign interference with their coasting trade. He was afterward, in consequence of the claims advanced by Sweden to Lapland, engaged in what is called the Calmar war with Charles IX. and his successor, Adolphus, and terminated it by an advantageous peace, in which he stipulated for the free navigation of the Baltic. In the Thirty Years' war he was beaten by Tilly at Lutteram-Barenberge in 1626, but afterward, in conjunction with Gustavus Adolphus, obtained the Treaty of Lübeck 1629. He has the merit of having laid the foundation of the Danish navy, extended the trade of his subjects to the East Indies, introduced a judicious system of finance, and fitted out several expeditions for the discovery of a northwest passage. He was succeeded by his son, Frederick III.

Christian V., king of Denmark and Norway: b. 15 April 1646; d. Copenhagen 25 Aug. 1699. He succeeded his father, Frederick III., in 1670, and carried on a long and fruitless war against Sweden.

Christian VI., king of Denmark and Norway: b. 30 Nov. 1699; d. 6 Aug. 1746. He succeeded his father, Frederick IV., in 1730.

Christian VII., king of Denmark and Norway: b. Copenhagen 29 Jan. 1749; d. Rendsburg, Holstein, 13 March 1808. He was the son of Frederick V., whom he succeeded in 1766. In the same year he married Caroline Matilda, sister of the British monarch, George III. He afterward traveled for three years in England, Germany, Holland, and France, and became a member of several learned academies. Youthful indulgences, however, had weakened his intellect, and obliged him to confide the charge of public business to his ministers, and more especially, it is said, to his favorite physician, Struensee, who, though he had gained the affections of Christian and his young bride, was very unpopular as a statesman, and made innovations which provoked the hostility both of the nobility and the army. Notwithstanding the unfortunate circumstances of Christian's reign,

several important improvements took place under it. Serfdom was abolished in the duchies, trade and commerce promoted, the Schleswig-Holstein Canal constructed, and excellent roads formed throughout the kingdom. Christian was succeeded by his son, Frederick VI.

Christian VIII., king of Denmark, and Duke of Schleswig-Holstein and Lauenburg: b. Copenhagen 18 Sept. 1786; d. there 20 Jan. 1848. He was chosen king of Norway in 1814, but unable to hold it against Bernadotte he abdicated in October of the same year. His reign was comparatively unimportant, the most notable event being the king's proclamation in 1846 that Schleswig and Holstein were inseparably united to Denmark. He was succeeded by his son, Frederick VII.

Christian IX., king of Denmark: b. 18 April 1818. He was the fourth son of the Duke of Schleswig-Holstein-Sonderburg-Glücksburg, and succeeded Frederick VII. as king of Denmark, 15 Nov. 1863. His second son was, in 1863, elected king of Greece, and his two eldest daughters married heirs-apparent of the crowns of Great Britain and Russia.

Christian, German prelate: b. early part of the 17th century; d. Tusculum, Italy, 25 Aug. 1183. He was made archbishop of Mainz in 1165. He was chiefly celebrated for his military exploits under Frederick Barbarossa, for whom he opened the way to Italy. He fell in battle endeavoring to rescue Pope Lucius III. from a hostile Roman army.

Christian, Charles, English engraver: b. London 1684; d. there 1725. His real name was Charles Christian Riesen. He was the son of a Dane. He is one of the most celebrated of gem engravers. One of his best works is a portrait of Charles XII. of Sweden.

Christian, Edward, English jurist: b. London 1774; d. Cambridge 1823. He was chief justice of the Isle of Ely, and law professor of Downing College, Cambridge. He was the author of various works, among which are treatises on the bankrupt laws, and on the game laws. He also edited an edition of Blackstone, to which he added numerous notes.

Christian, The, a novel by Hall Caine, published in 1897. For the most part the scene is laid in the London of to-day. The details of London life are spectacular, and the object of the book seems to be to show the inadequacy of London churches to save the city.

Christian Architecture, a style of architecture adopted for religious buildings after the introduction of Christianity. The Roman Early Christian style appeared first in basilicas and circular churches. The former were, doubtless, originally built on the model of the Roman basilicas, but the requirements of the new religion soon necessitated various modifications in the original plan. The Christian basilicas were constructed generally with three aisles; the central one broader than the others, the left or north being reserved for males, and the right or south for females. Sometimes we find five aisles. The building terminated in a semicircular apse. The decorations consisted of paintings and mosaics, used mainly in the apse. The pillars were generally of the Corinthian order. Symbols were largely introduced. These were the cross and the lamb, symbols of Christ, the dove, as typifying the Holy Spirit, and a fish, used as a symbol of Christ from the letters of the Greek word *ichthus*=a fish, forming the initials of the titles of our Lord, *Iēsous Christos, Theou huios, sōter*=Jesus Christ, the Son of God, the Saviour. The roofing was of beams with flat paneling, frequently gilt. The altar stood at the east end in front of the apse. The space round the altar was railed off and called the sanctuary. Adjoining the entrance was generally a narrow space called the Narthex. In the middle of a portico in front of the building was a bowl for washing the hands. A crypt was constructed under the altar for the reception of the bones of the patron saint. See also ARCHITECTURE.

Christian Brothers. See BRETHREN OF THE CHRISTIAN SCHOOLS.

Christian Brothers, College of, situated in St. Louis, Mo. In 1855 it was established and incorporated with power to confer degrees. The modern language department is given special attention, the pupils being required to converse and write in French, German, and Spanish. Practical engineering, mechanical and scientific draughting and designing are emphasized in the scientific department. Literary and musical courses are aided by the various organizations which contribute to the development of good taste. The graduates of this college are among the distinguished men of the country.

Christian Catholic Church. See DOWIE, JOHN ALEXANDER.

Christian Church, The, is really the Church established by Jesus Christ when he was here upon earth. All are considered members of this Church who have been baptized in the name of Christ, and who accept his doctrines and live in harmony with them. (See Matt. xxviii. 19, 20.) The first great increase was at Pentecost, when 3,000 people were converted; and shortly after, through the teaching of the apostles, 5,000 were added to the Church. (See 'Acts.') Stephen was the first to suffer martyrdom for Jesus Christ. Paul made three great missionary tours, established churches in many places, and the result of his work, aided by the 12 apostles and disciples, was the organic unity of the Church in the first period of the Christian Era.

Ancient Period, 30–750 A.D.—The first part of this period was distinguished by great simplicity of doctrine and life, and zeal in extending the kingdom of Christ. Important centres were established, but the gospel was largely confined to the middle and lower classes. Controversies arose between the Gentile and Jewish Christians, but not to such an extent as to arrest steady progress. The heretical sects, with Saturnius, Basilides, and others at their head, were of no serious injury. The chief defenders of Christianity were Aristides, a Christian apologist, Justin Martyr, Melito, Tatian, Hermas. This was the time of great persecutions. There were 10 in all, the most serious being under the emperors Nero, Decius, and Diocletian. The Scriptures were collected into a canon, and the Church made great advance in numbers and territory. The most important writers were Ignatius, Irenæus, Origen, Tertullian, and Clement of Alexandria. The more serious schisms were produced

through Felissimus, Novatus, and Miletus. The doctrinal controversies related chiefly to eschatology, human depravity, and the divinity of Christ. The Council of Nice (325 A.D.) was a great triumph for orthodoxy. It declared the essential Trinity of the Godhead, and settled for all time the divinity of Christ as a fundamental doctrine of Christian faith. The heresy of Arius was condemned. Persecution ceased, through the sympathy of the Emperor Constantine, who, in 313, removed all disabilities from Christians, and in 323 made Christianity the state religion of the Roman empire. Monasticism, a reaction against worldliness, increased rapidly. Julian the Apostate endeavored to revive paganism, but without avail. Pope Leo the Great greatly extended the authority of the Western Church. Mohammedanism paralyzed the Eastern Church for a time. Mohammed was born in Mecca, Arabia, 570; declared himself a prophet in 609; founded a new religion, based upon the Koran; conquered Arabia, and died in 632. He was succeeded by the caliphs, who conquered all north Africa, western Asia, and gained a foothold in Spain and the south of France. Mohammedanism was arrested in western Europe by Charles Martel, by the victory of Tours, in 732. The most important recent defeat of Mohammedanism in Europe has been the triumph of Russia over Turkey in the war of 1877, and the practical disruption of Turkey in Europe, and the liberation of the Christian provinces. Pope Gregory the Great ruled from 590 to 604. He organized orders, elaborated the Church festivals, and established a mission among the Anglo-Saxons. The Gospel spread rapidly through Great Britain and Germany. Christian art was patronized liberally by the Roman pontiffs. The close of the ancient period found the Latin or Western Church very vigorous and aggressive, but the Eastern Church in a stagnant condition.

Mediæval Period, 750–1517 A.D.—This period falls into three great divisions: From Charlemagne to Gregory VII. (750–1073); from Gregory VII. to the flight of the Pope to France (1073–1305); from time of the Pope's residence in France to Reformation (1305–1517). The Middle Ages were the transition from the ancient to the modern period. The most important political events, all of which had a bearing on the Church, were the end of the Greek exarchate in Italy; the destruction of the Lombard kingdom, the organization of the Frank empire under Pepin, rise of the new Germanic Church, division of the Mohammedan caliphate, decline of the Greek empire, and development of the new Roman empire in the West. Charlemagne was the greatest mediæval ruler. He was victorious over many northern tribes, and increased the territory of the Church to vast proportions. He was a liberal patron of learning, and authorized a Latin version of the Scriptures. Alfred the Great of England reigned from 871 to 901, and was as distinguished for learning as for his power to rule. The Russian monarchy was founded by Ruric in the middle of the 9th century. At this time the evangelization of heathen nations progressed rapidly. The Hungarians, Bulgarians, Bohemians, Moravians, Wends, and Scandinavians accepted Christianity. Great disorders appeared in the Church at this time. Strifes arose over the papacy, and the civil powers endeavored to dictate the appointments of bishops and the disbursements of ecclesiastical funds. The violent rule of the Mohammedans over Palestine excited the wrath of western Europe, and crusades were organized for the rescue of the country from the Moslems. There were seven crusades, extending from 1096 to 1272. Christian Europe failed, finally, to hold the country, but the general effect of the crusades was beneficial in the development of commerce, introduction of Oriental thought, and the knowledge of various Oriental sciences. Heretical movements were inaugurated through the Waldenses (1170); Wyclif (1324); John Huss (1373); the Moravian Brethren (1417). Mysticism greatly developed at this period (Tauler, Suso, Ruysbroek, Groot, Thomas à Kempis) and Savonarola (1480–97). Mendicant orders were established. The Inquisition was established in 1215 to check heresy.

The Modern Period, 1517 to the Present.—In the first quarter of the 16th century began the religious movement commonly called the Reformation. Martin Luther, born in 1483, a priest and Augustinian monk, began an agitation against the authority of the Pope. He published 95 theses against Rome, preached sermons and, in various ways sought to change some of the conditions which existed. He spread the Scriptures, which had previously been translated into German, and gained the co-operation of the German princes, and published sermons and other works against the Roman Catholic Church. Melanchthon was the chief doctrinal writer of the Reformation. Erasmus labored in the department of New Testament criticism, but never left the Church. The leading Swiss reformers were Zwingli in eastern Switzerland, and the learned and austere Calvin in western. Farel stood next to Calvin in Geneva. The English Reformation had King Henry VIII. on its side, through no pious motives, but because the Pope would not sanction his divorce from Catharine of Aragon. This was the great opportunity for which the Reformers of England had been waiting. Under the royal protection Protestantism grew rapidly, but received a set-back in Queen Mary's reign. Under Elizabeth the Reformation was placed on a firm foundation. The Puritans were a reaction against what yet remained of the old faith and practices in the Church of England. Arminius, born 1560, in Holland, opposed the chief tenets of Calvinism. The Synod of Dort resulted in the political triumph of the Calvinists, and the expulsion of the Remonstrants, until the death of Maurice (1630). The Thirty Years' war (1618–48) was confined to the continent, and established the territorial boundaries of the Protestant and Catholic nations. The Huguenots were the representatives of Protestantism in France. The Jesuits, organized by Ignatius Loyola, 1540, were established as an offset to the aggression of Protestantism. Deism prevailed to an alarming extent in England, its chief promoters being Hobbes, Herbert, Shaftesbury, Tindal, Bolingbroke, Hume, and Gibbon. They had strong antagonists (Baxter, Cudworth, Taylor, Wateland, Leland, Butler, Paley), but the general condition of the people was irreligious. Methodism, which was begun by John Wesley, born 1703, was a fervent religious movement. Charles Wesley, Whitefield, John Fletcher, Joseph Benson, and Adam Clarke were strong coadjutors.

German Rationalism arose in 1750, through the teachings of Wolfe, Semler, and the example of the Prussian court. It is now in decline, through the labors of Tholuck, Neander, Hengstenberg, Ullman, and others. The Evangelical Alliance (1846) has sought to promote the unity of Protestant Christians in all parts of the world, and, to a corresponding degree, the victory over skepticism. The Old Catholics, a Roman Catholic reaction against the Vatican Council of 1869, were organized into a Church in 1870; Döllinger, Huber, and Friedrich were at their head. They have made but little progress.

The American Church.— The colonization of North America in some parts sprang from religious motives. The colonists sought freedom here because of the oppressions at home. Periods of American Church history: (1) From 1607–60, revival and progress. (2) 1660–1720, trial, disputes with Great Britain, religious decline. (3) From 1720–50, great revivals. (4) From 1750–83, political agitation, freedom from British rule. (5) From 1783 to the present, extensive revivals, separation of Church and state, abolition of slavery, evangelization. The Protestant Episcopal Church was founded by the James River Colony (1607); its first General Convention was in 1785; it ratified the 39 Articles in 1832. The Puritan Pilgrims landed at Plymouth in 1620, and began the development of Congregationalism. The Cambridge Platform was established in 1648. The Reformed (Dutch) Church was established in 1628 in New Amsterdam (New York). The first independent organization was in 1771. The Baptists began in Providence, R. I., in 1639, through Roger Williams. The Reformed (German) Church was organized in 1741. The Lutherans were established first in New York in 1669; the first Synod was held in 1748. The Presbyterians were organized at the close of the 17th century. The first Presbytery was established in Philadelphia in 1706, and the first General Assembly in 1789. The first Methodist Society in the United States was established in New York in 1766, and the first Conference was held in Philadelphia in 1771. The Reformed Episcopal Church was organized in New York in 1873, under Bishop Cummins. The Roman Catholic Church in the United States was first established in Maryland through immigration in 1632. The Episcopal see of Baltimore was established in 1789. For statistics of the American churches see the separate articles.

Christian Endeavor, Young People's Society of, a society distinctly religious in all its features; organized 2 Feb. 1881 in Williston Church, Portland, Maine, by the Rev. Francis E. Clark, D.D. From one small association it has expanded into over 57,000 societies, in all parts of the world, with an aggregate membership (1900) of 3,500,000. In addition to the main organizations in the United States it has been found necessary to form branches, among which are the Juniors, organized 27 March 1884, at Tabor, Iowa, by the Rev. J. W. Cowan and Miss Belle Smith; the Intermediate, organized by the Rev. A. Z. Conrad of Worcester, Mass.; and the Mothers', suggested by Mrs. Amanda B. Fellows of Chicago, and organized in April 1893 at Topeka, Kan., by Mr. F. C. Barton. Among other special branches are the Life Savers', instituted by the Rev. S. Edward Young at the United States Life-Saving Station at Asbury Park, N. J.; the Travelers' Christian Endeavor Union, organized at Philadelphia, 14 Nov. 1892, for work among commercial travelers; the Floating societies for work in the United States navy and among seamen generally; and various other organizations whose fields of labor lie among the Chinese, the Indians, convicts in prison, etc. The first Christian Endeavor Society in England was organized in 1887, and was followed by similar ones in other countries, and the constitution has been printed in over 30 different languages. The movement is not a denominational one. Any society belonging to an evangelical Church, which adopts the leading principles as set forth in the constitution, including the prayer-meeting pledge, and which guarantees these principles by the name Christian Endeavor either alone or in connection with a denominational name is admitted to all the privileges of the organization. In the United States the Presbyterian Church has the largest number of societies; in England the Baptists lead; while in some parts of Canada and Australia, the Methodists are in advance of all others. In some of the American States, the Disciples of Christ, and in others the Congregationalists, claim the largest number.

The distinctive features in the Christian Endeavor movement are its work among the young people, leading them to consecrate their lives to the active service of God; the weekly prayer-meetings, which each member takes a solemn pledge to attend regularly (unless unavoidably detained), and to take part in; and the reconsecration meetings held once a month, at which special efforts are made to see if each one has been faithful to his pledges. The amount of good accomplished in training the young people in the practical work of Christianity and fitting them to take up the work of those dropping out of active service can never be fully estimated. The World's Union of Christian Endeavor held its first triennial convention at Washington, D. C., in July 1896, which was attended by representatives from all over the world. Rev. Dr. Clark was elected president, and Rev. W. J. L. Closs of Australia was made the first secretary of the new organization. The United Society of Christian Endeavor is a bureau of information, which simply seeks to spread the idea of the movement throughout the world. Its headquarters are in Boston, and John Willis Baer is the secretary.

FRANCIS E. CLARK.

Christian Era, the era or epoch introduced by the birth of Christ. It was calculated back about the year 532, by a monk, Dionysius Exiguus (the latter word, meaning little, being assumed either because his stature was diminutive or because he modestly believed his mental powers small, which they were not). Dionysius was a resident of Syria. It is thought that he fixed the advent too late by four years, and that consequently Jesus was born, if the contradiction in terms can be permitted, in 4 B.C. J. W. Bosanquet considers that it was in 3 B.C. The Christian Era is sometimes called the Dionysian era. The Rev. Charles Force Deems, D.D., an eminent American clergyman, in his 'Jesus,' places the birth "about the beginning of August, 6 B.C., 747 A.U.C.

Christian Knowledge, Society for the Promoting of, the oldest and greatest of the great religious associations connected with the Church of England. It is popularly referred to as the

«S. P. C. K.» It was founded in 1698, although it did not receive its present name till 1701; and had for its objects:

'1. To promote and encourage the erection of charity schools in all parts of England and Wales; 2. To disperse, both at home and abroad, Bibles and tracts of religion; and, in general, to advance the honour of God, and the good of mankind, by promoting Christian knowledge both at home and in other parts of the world by the best methods that should offer.' These objects it has never ceased to pursue, chiefly directing its efforts to Great Britain and the colonies; partaking at once of the nature of an educational association, a missionary society, a Bible society, a religious tract society, and an emigrants' spiritual aid society; and notwithstanding the operations of other great societies in these several departments of Christian benevolence, its revenue amounts to above $250,000 a year. The publishing and bookselling business shows in some years total sales of $450,000; the works published being in very various departments of literature, and including several admirable series on Early Britain, Diocesan Histories, Ancient History from the Monuments, Early Chroniclers, &c.

The Protestant missionaries who labored in the south of India in the 18th century were supported chiefly by this society, and it is now chiefly engaged in supplying to the mission-field throughout the world needful religious literature in the vernacular. Besides translations of the Bible and Prayer-book, it provides for pioneer missionaries, grammars, dictionaries, reading-books, and general literature, to instruct them in the languages which they will have to use. In Scotland a similar society was organized in 1709, and in 1902 had an annual expenditure of $25,000.

Christian Science. For a definition of Christian Science it is sufficient to quote one that has frequently been used and which will be acceptable to Christian Scientists generally: «The foundational truths of Christian Science are the reality and allness of God, the unreality and nothingness of matter, the spirituality of man and the universe, the omnipotence of good, the impotence of evil. The demonstrative actuality of Christian Science essentially distinguishes it from all other religions of the age.» As presented in 'Science and Health with Key to the Scriptures,' by Mary Baker G. Eddy: «The physical healing of Christian Science results now, as in Jesus' time, from the operation of divine Principle, before which sin and disease lose their reality in human consciousness, and so disappear as naturally and as necessarily as darkness gives place to light, and sin to reformation. Now, as then, his mighty works are not supernatural, but supremely natural. They are the sign of Immanuel, or 'God with us'—a divine influence ever present in human consciousness, and repeating itself, coming now again, as was promised aforetime,

> To preach deliverance to the captives (of sense),
> And recovering of sight to the blind,
> To set at liberty them that are bruised."
> (*Preface*, p. xi.)

Its purpose is not to supplant primitive Christianity, but to render our understanding of it more practical. It is the claim of Christian Scientists that Jesus proved what man may do through absolute reliance upon God, and Mrs. Eddy teaches how it may be done.

The principal mission of Christian Science is to give an enlarged spiritual explanation of the infinite personality of God as Spirit, to define the very nature and essence of God, and thereby increase mortals' faith and trust in Him. Christian Scientists believe that God should be recognized in all the affairs of men.

The history of Christian Science dates back to 1866, the year of Mrs. Eddy's discovery, and the growth of the movement during subsequent years has been so rapid that the denomination now commands a position of wide influence and power. Mrs. Eddy, the recognized discoverer and founder of Christian Science, began to win followers in 1867. In 1875 she published 'Science and Health with Key to the Scriptures,' the text-book of Christian Science, which has passed through more than 290 editions of 1,000 copies each. In 1879 she founded the first Christian Science Church, and in 1881 she opened a college for the teaching of Christian Science, called the Massachusetts Metaphysical College, where she personally taught about 5,000 students, who passed through this college. In 1883 she established the first denominational periodical and became its editor.

In Mrs. Eddy's personal history there is nothing mysterious or concealed. She has never made any miraculous claims. Her life has been simple, her girlhood, save for its eager religious questioning, not unusual. She was born in a little village in New Hampshire, sheltered by the hills that rose to the soft blue skies, and sentineled by oak and pine and hemlock. Here the Baker homestead stood, and here Mary Baker's girlhood days were spent. To this charming New Hampshire village, now greatly changed, come small parties of Christian Scientists during the summer months, eager to tread the paths familiar to the beloved founder of their faith. These visits are a remarkable evidence of the love which Mrs. Eddy has inspired, and bespeak the power of her influence over so many hearts.

She comes of that mixed English and Scotch Puritan ancestry which formed so much of the best of New England's stock. Some of her forefathers were men of mark in war and statesmanship. Gen. Knox, of Revolutionary fame, was a relative of her father, and among others of her ancestors were Sir John Macneil, who fought at Lundy's Lane. Mary Baker's father was a man of sturdy piety and strict probity. Of Mrs. Eddy's mother the little that has been recorded leaves the impression of one of those New England mothers whose strict notions of propriety were tempered by an innate sweetness of temperament. From her brother, Hon. Albert Baker, who was nominated for a congressman by the largest vote ever polled in New Hampshire (dying, however, before his election), Mrs. Eddy derived her knowledge of Greek, Hebrew, and Latin. Charity and benevolence ruled the household. Mrs. Eddy speaks of her childhood's home as «one with the open hand, where the needy were ever welcome.» From such a family and such a home, full of the beautiful simplicity of the rural life of early New England, came the only woman in history who has ever founded a great religious denomination.

Doctrinal questions early engaged her eager

and active mind. In her book, 'Retrospection and Introspection,' she has described how she cast from her the doctrine of predestination, in which belief she had been carefully nurtured by her Calvinistic parents. Her soul revolted from what she regarded as the inhumanity of extreme Calvinism, and before the meeting, where she applied for church membership, she bravely disavowed a belief in those tenets. Thereafter she was active in church work, engaging in much speaking and writing. Three years she spent in Scripture study in the preparation of her work, 'Science and Health.'

Of this period she writes: "For three years after my discovery I sought the solution of this problem of mind-healing; searched the Scriptures, read little else; kept aloof from society, and devoted time and energies to discovering a positive rule. The search was sweet, calm, and buoyant with hope, not selfish nor depressing. I knew the principle of all harmonious mind-action to be God, and that cures were produced, in primitive Christian healing, by holy, uplifting faith; but I must know its science, and I won my way to absolute conclusions, through divine revelation, reason, and demonstration. The revelation of truth in the understanding came to me gradually, and apparently through divine power." ('Science and Health,' p. 109.)

The love in which Mrs. Eddy is held by Christian Scientists — and there is no mistaking the reality or genuineness of the affection — is called forth by what she has wrought, and goes out to her as the bearer of a great spiritual message. This is expressed in the speech and writings of Christian Scientists and is a constant tribute to the wisdom and success of her leadership. It is true that they regard her as the greatest woman of her time; considered in her relation to religious truth, the greatest of all time. But this is very different from fulsome adulation, or from the vulgar attribution of miraculous powers.

The total number of Christian Science churches and societies, here and abroad, in June 1903, was 769, showing the remarkable increase of 228 in three years. Greater New York has nine Christian Science churches; Chicago, six; Minneapolis, four; Milwaukee, three. The doctrines of Christian Science have secured a firm foothold in Great Britain and Germany, and the present indications are that the growth of the denomination in those conservative countries will be as rapid as in the United States and Canada. The directory of practitioners published in a recent issue of the official organ of the denomination includes the names of persons in 49 States and Territories of the United States, including Hawaii, the Philippine Islands, and Porto Rico; England, Ireland, Scotland, Wales, Canada, France, Germany, Italy, Switzerland, Australia, Mexico, China, and the Bahamas. Besides the churches there are many free reading-rooms — more than 450 in the United States alone. These reading-rooms are a feature of the denomination, and are to be found in many of the cities abroad where Christian Science has found lodgment.

The First Church of Christ, Scientist, in Boston, Mass., was finished in 1894 at an expense of over $250,000 and was dedicated free of debt, in fact it was necessary to issue notice that no more contributions would be received. It is known as the "Mother Church," all the other churches being branches of this one. This was the first church devoted to the uses of the denomination, and all the others have, therefore, been built within nine years, a very remarkable growth.

In recent years the growth of the congregation in attendance at the Mother Church has been so great that branch churches have been established in Roxbury, Cambridge, and Chelsea, but the relief thus gained has not been sufficient, and work has recently been commenced upon a larger building which will have a seating capacity of 5,000 and will cost over $1,000,000.

The denomination, numerically, is very evenly distributed. The "Directory of Christian Science Practitioners" in 'The Christian Science Journal' shows that there is hardly a city in the Union but contains within it one or more adherents of the faith who devote their entire time to healing the sick. Then, too, the Board of Lectureship, comprising well-known and representative men and women, is a growing and efficient means of spreading a knowledge of the new doctrines.

The Mother Church in Boston included in June 1903, according to official figures, 27,796 members, 3,696 of whom had been added since the preceding June. Membership in this church is not confined to Christian Scientists residing in Boston.

The growth of the denomination has not been due to any effort on the part of Christian Scientists to proselyte from or misrepresent other denominations, but rather to the fact that the practical application of the teachings of Christian Science has proved beyond contention to thinking people who have investigated the subject that salvation is possible and within the reach of all who faithfully and earnestly strive for it. It is not the purpose of Christian Scientists to interfere with those who are satisfied with their religious beliefs, nor do they seek to force their views upon those who do not agree with them.

The nine years succeeding the building of the Mother Church have constituted a period of great activity and growth, especially in the way of church-building, and in many of the smaller cities and towns, as well as in the larger cities of the country, large and in some instances quite expensive edifices have been erected. It is an unwritten law of the denomination that a church building shall not be dedicated until it is paid for. Some congregations have built chapels to which they propose to add churches as the need arises; others have purchased old churches or family mansions, which they have remodeled and refurnished to meet their requirements, while a number have bought sites on which building operations will shortly be begun. In all this activity there is evidence of the great outlay of time, services, and money, which are given not only cheerfully, but eagerly; and all this has gone on at a steadily increasing pace, to which one can as yet see no probability of interruption. Early in 1904 there was in course of construction in Concord, N. H., a fine church edifice which represents a gift of $120,000 by Mrs. Eddy to the Christian Scientists of her home city.

Organized Christian Science is perhaps less than seven years old in England. From 1894 to 1897 its meetings in London were confined to drawing-rooms, but in the latter year a regular meeting-place was engaged. But it was not until

1899 that First Church of Christ, Scientist, in London, was formed, followed later by Second Church of Christ, Scientist.

In Germany there has been some progress. Berlin has a church organized some time ago with the permission of the authorities, as is usual in such cases. In that city is a Christian Science reading-room maintained by the church organization. The question of the new faith came up in the Reichstag, and the imperial secretary of state then said: "I warn earnestly against using the power of the state against such things."

Wherever established, the Church numbers among its adherents men and women of distinguished intellectual ability. There as here, they are largely recruited from the professional ranks — judges, lawyers, doctors. Critics of the new denomination have frequently noted that the membership of the Church represents the "upper classes" — the classes which socially are near the apex, but while this is in some measure true, it is not to be understood that the Christian Science Church is "a rich man's church." On the contrary it is most democratic, and its members have been drawn from almost every rank and condition of society.

Practically all the adherents of Christian Science have been healed of severe and chronic sickness which in past years impoverished many of them or rendered the transaction of business and the earning of more than a meagre livelihood a physical impossibility. These people, now being restored, through the recovery of their health, to their legitimate place in the business and social world, give an air of prosperity to the congregations of which they are members.

A distinctive feature of the religious services of the denomination is the "Wednesday evening meeting" at which testimony is given by those who have been healed of physical disease or reformed from the practice of sinful habits, through the operation and practice of Christian Science. It is proverbial that every religious reformer has had to overcome prejudice and opposition, and in this regard the founder and leader of Christian Science is not an exception.

It should be remembered that there are no personal pastors in the Christian Science churches. This rule is observed with a view to the emphasizing of truth rather than personality. The place occupied in other churches by pastors is filled by trained and educated leaders called readers.

In the early years of Mrs. Eddy's work she met much opposition from those to whom it seemed impossible that the healing work of Jesus and the apostles should be revived, but this opposition and the prejudice from which it sprang is becoming less and less each year until Christian Science has now taken its place as a practical and beneficent religion, and it is so regarded by a constantly increasing and ever loyal constituency.

Certainly few teachings have made greater progress in the world than the faith to which the name of Mrs. Eddy is linked. Christian Science is no mere exclusive tenet, held by a small knot of believers. It is a growing and important faith, ranking in the number of its adherents with the great established denominations of Protestantism. Entertain what views its critics may of the basic doctrine advanced under the name of Christian Science, certainly the charge of fanaticism cannot be in any way successfully maintained.

In a quiet, undemonstrative way its adherents have gone about their task; there has been no proselyting, in the usual sense of that term; there have been no sensational sermons, such as attract vast metropolitan audiences. With none of these adventitious aids to the spread of its doctrines, Christian Science has made extraordinary progress. It has moved like an army and, ere the world was aware of it, the great host had taken its place among the foremost of the established religious orders of the universe. Consult the works of Mrs. Eddy and the 'Christian Science Journal' (Boston).

ARCHIBALD MCLELLAN,
Editor Christian Science Journal.

Christian Union Churches, an American denominational union, organized in 1865, composed of members of all varieties of orthodox belief. Their creed is simple, covering the headship of Christ, sufficiency of the Bible, and right of local Church government. They have a membership of about 30,000 and fully 150,000 adherents, and are located chiefly in the older western States. In 1899 they had approximately 183 ministers, and 294 churches. They are in affiliation with the Christians.

Christian University, a co-educational institution in Canton, Mo.; organized in 1853, under the auspices of the Disciples of Christ; reported at the end of 1899: Professors and instructors, 22; students, 150; volumes in the library, 1,000; grounds and buildings valued at $40,000; productive funds, $18,000; benefactions, $1,200; income, $5,000; number of graduates, 227; president, Clinton Lockhart, A.M., Ph.D.

Christian Woman, A, a novel by Emilia Pardo-Bazán. In this interesting tale the author presents a very realistic picture of modern Spanish life, into which are introduced many current social and political questions.

Christian Year, The, by John Keble, an English divine. The book is a small volume of religious poems, which first appeared in 1827. It contains a thought or thoughts, expressed in poetic form, for each day of the year. The poems have all the polish and simplicity which come from classical study and artistic workmanship. The book, at once, became popular, and has held favor ever since. Cardinal Newman said of this work: "It was the most soothing, tranquilizing, subduing work of the day. If poems can be found to enliven in dejection and to comfort in anxiety, to cool the oversanguine, to refresh the weary, and to awe the worldly, to instill resignation into the impatient and calmness into the fearful and agitated, they are these." See KEBLE, JOHN.

Christiana Case. On 11 Sept. 1851, Edward Gorsuch of Maryland, his son, a party of friends, and a United States deputy marshal, having secured a warrant from a Philadelphia commissioner for the arrest of a fugitive slave (alleged to have been Gorsuch's own son), came to Christiana, Lancaster County, Pa., approached the house where the fugitive had taken refuge, and demanded possession of him, firing two shots at the house. The neighborhood was aroused, and several armed colored men appeared on the scene, as also did Castner

Hanway and Elijah Lewis, Quakers, who tried to persuade both parties to disperse. The deputy marshal ordered them to join his posse; they urged him to withdraw for his own sake; Gorsuch and two of his party fired on the colored men, who returned the fire, killed Gorsuch and his son, and forced the rest to fly. The fugitive slave escaped. The two Quakers were indicted for treason; the grand jury found bills against them; and they were tried 24 November before Justice Grier of the supreme court. Among the counsel for their defense were Thaddeus Stevens and T. L. Cuyler; the chief argument was by J. M. Read. The absurdity of the accusation was so great that the Democratic judge charged emphatically for the prisoners, and the jury acquitted them without leaving the box.

Christiancy, Isaac Peckham, American editor and diplomatist: b. Johnstown (now Bleeker), N. Y., 12 March 1812; d. Lansing, Mich., 8 Sept. 1890. He was one of the founders of the Republican party and espoused its cause as editor of the 'Monroe Commercial.' In 1875 he was chosen United States senator from Michigan, and in 1879 became minister to Peru.

Christiania, krēs-tē-ā'nē-ạ, Norway, capital, city and port, province Aggershuus or Christiania, at the head of the long narrow inlet called Christiania Fjord, about 60 miles from the open sea or Skager Rack. High hills rise around it on all sides, excepting toward the bay, but at considerable distances, particularly on the north. The most interesting building in the town is the fine old castle of Akershus (built about 1300), with its church and planted ramparts, crowning a point jutting out into the fjord, and commanding a fine view, but of no military value. On a gentle elevation, and in the midst of a beautiful park stands the royal palace — a massive square building, without any architectural ornament, but commanding delightful views of the fjord and its beautifully winding shores. The hall in which the Storthing holds its sittings is a very plain building. The other public edifices are the military academy, cathedral, university, etc. Attached to the university is a museum, containing a fine collection of antiquities. The climate of Christiania is delightful. It is screened from violent winds; and even in winter, though the cold is severe, the weather is seldom variable, but bright and settled, and free from damp and fog. In summer it is warm but not sultry, with a light and buoyant atmosphere. The few manufactures of the city consist of woolen cloth, iron-ware, tobacco, paper, leather, soap, spirits, glass, etc. There are also some extensive breweries. The exports are principally timber, deal planks, and iron. The environs of the city are exceedingly beautiful, the approach to it by the magnificent fjord, at the head of which it is situated, exciting the admiration of all visitors. The fjord is frozen for upward of two months in the year, for about 20 miles from Christiania to the sea; and the harbor is generally locked up for three or four months. Pop. 203,337.

Christianity, the religion instituted by Jesus Christ. Christianity, as it now exists in our minds, has received, from the influence of national character, of the spirit of the time, and the thousand ways in which it has been brought into contact with politics and science, a variety of impure additions, which we should first separate in order to understand what it is in reality. There could be no better means of attaining a correct understanding of it than to investigate, historically, the religious principles which Jesus himself professed, exhibited in his life, and labored to introduce into the world, if the investigator could avoid giving the coloring of his own views to his explanation of the records of the origin of Christianity. But the most honest inquirers have not entirely succeeded in so doing. Even the Christian theologians of the present age, though divided less by the spirit of creeds and parties than of scientific methods and philosophical speculations, dispute respecting the principle that constitutes the basis of the religion of Christ. This principle appears, by its effect upon the numerous nations, differing so greatly in intellectual character and cultivation, which received Christianity at first, to have been a universal truth adapted to the whole human race, and of a divine all-uniting power. The Jews believed in a living God, the Creator of all things, and, so far, had just views of the source of religion. The Greeks, besides developing the principle of the beautiful in their works of art, had laid the foundations of valuable sciences applicable to the business of life. The Romans had established the principles of law and political administration, and proved their value by experience. These scattered elements of moral and intellectual cultivation, insufficient in their disunited state to bring about the true happiness and moral perfection of man in his social and individual capacity, were refined, perfected, and combined by Christianity, through the law of a pure benevolence, the highest aim of which is that of rendering men good and happy, like God, and which finds in the idea of a kingdom of heaven upon earth, announced and realized by Christ, all the means of executing its design. His religion supplied what was wanting to these nations — a religious character to the science of Greece, moral elevation to the legislative spirit of Rome, liberty and light to the devotion of the Jews — and, by inculcating the precept of universal love of mankind, raised the narrow spirit of patriotism to the extended feeling of general philanthropy. Thus the endeavors of ancient times after moral perfection were directed and concentrated by Christianity, which supplied at the same time a motive for diffusing more widely that light and those advantages which mystery and the spirit of castes had formerly withheld from the multitude. It conveyed the highest ideas, the most important truths and principles, the purest laws of moral life to all ranks; it proved the possibility of perfect virtue through the example of its Founder; it laid the foundation for the peace of the world through the doctrine of the reconciliation of men with God and with each other; and, directing their minds and hearts toward Jesus, the Author and Finisher of their faith, the crucified, arisen, and glorified Mediator between heaven and earth, it taught them to discern the benevolent connection of the future life with the present. The history of Jesus, and the preparations of God for his mission, afforded the materials from which Christians formed their conceptions of the character and tendency of their religion.

The first community of the followers of Jesus was formed at Jerusalem soon after the death of their Master. Another at Antioch in Syria first assumed (about 65) the name of Christians, which had originally been given to them by their adversaries as a term of reproach; and the travels of the apostles spread Christianity through the provinces of the Roman empire. Palestine, Syria, Asia Minor, Greece, the islands of the Mediterranean, Italy, and the northern coast of Africa, as early as the 1st century, contained societies of Christians. Their ecclesiastical discipline was simple and conformable to their humble condition, and they continued to acquire strength amidst all kinds of oppression. At the end of the 2d century Christians were to be found in all the provinces, and at the end of the 3d century almost a half of the inhabitants of the Roman empire and of several neighboring countries, professed this belief.

From the first council of the Church held in Jerusalem, before the apostles dispersed to teach all nations, the followers of Christ strove to keep united, to preserve the faith and discipline left them by their Founder. When any person or persons of influence advanced a teaching which seemed to Christians to be not in accord with the faith as given to them by Christ, it was customary to call together the bishops, as at Jerusalem, and discuss the disputed questions, in order to learn by traditional and historical evidence the truth. Such meetings or assemblies when called by the Bishop of Rome were known as General Councils, but if by any other bishop they were called provincial councils. Certain scholarly men who were zealous in the cause of Christianity gathered together the authoritative teachings and generally accepted traditions of the times, and thus left on record the history of the first years of Christianity from theological and dogmatic points of view. These men are styled fathers or doctors of the Church. The teachings of the councils and the fathers were potent factors in fostering unity among Christians. Those who did not accept the teachings of the councils were called heretics.

Christianity was introduced among the Goths in the 4th century, and spread among the other Teutonic nations in the west and north of Europe, and subjected to its power during the 7th and 8th centuries the rude warriors who founded new kingdoms on the ruins of the Western empire. Meanwhile, however, it was losing ground in Asia and Africa before the encroachments of the Saracens, by whose rigorous measures hundreds of thousands of Christians were forced into Mohammedanism, the heretical sects which had been disowned by the orthodox Church being almost the only Christians who maintained themselves in the East.

During the progress of Mohammedanism, which, in Europe, originally extended only to Spain and Sicily, the Roman popes, who were advancing systematically to full ecclesiastical superiority in the west of Europe, gained more in the north, and soon after, in the east of this quarter of the world, by the conversion of the Slavonic and Scandinavian nations (from the 10th to the 12th century), than they had lost in other regions. For the Mohammedans had chiefly overrun the territory of the Eastern Church, which had been since the 5th century no longer one with the Western (Latin) Church, and had by degrees become entirely separate from it. In the 10th century it received some new adherents by the conversion of the Russians, who are now its most powerful support. But the Crusaders, who were led partly by religious enthusiasm, partly by the desire of conquest and adventures, to attempt the recovery of the holy sepulchre, gained the new kingdom of Jerusalem, not for the Greek emperor, but for themselves and the papal hierarchy. The confusion which this finally unsuccessful attempt against the infidels introduced into the civil and domestic affairs of the western nations gave the Church a favorable opportunity of increasing its possessions and asserting its claims to universal monarchy. But, contrary to the wishes and expectations of the rulers of the Church; the remains of ancient heresies were introduced into the West through the increased intercourse of nations and by the returning Crusaders, and new ideas of another sort were also propagated, springing from the philosophical spirit of examination of some of the schoolmen.

Wickliff in England and Huss in Bohemia began attacks on the popes and bishops because of abuses which had crept into the Church. Their action led to a revolt against ecclesiastical authority which resulted in many leaving the Roman Catholic Church. In regard to the movement that took place in the next century, and in which Luther was the great actor, we refer the reader to the article REFORMATION, and the articles relating to it. The Reformation is naturally regarded with widely different sentiments by Protestants and Roman Catholics. But that this great change in the Church has restored Christianity to its original simplicity and purity the most zealous Protestant will not assert, any more than the reflecting Catholic will deny the necessity that then existed for some reform — a necessity which indeed resulted in the holding of the Council of Trent. On this subject a Roman Catholic writer remarks that "The true and Catholic Reformation, long desired, but delayed by many difficulties, was taken up and successfully accomplished by the Council of Trent (1545–63)."

No one can claim, rightfully, the name of Christian unless he is a believer in the divinity of Jesus Christ, but Christianity or the teachings of Jesus Christ are believed and practised by many who do not believe that Jesus Christ is God.

Christian'ity and Is'lam: the Bible and the Koran, the title of a work by the late Dean of Winchester, William Richard Wood Stephens, published in 1877. This book presents the estimate of Mahommet's mission and its results, which seems fair to a conservative English Churchman. It is his desire to do justice to the teachings of the Koran, and to make a full admission of the inherent defects and vices of the races over whom the influence of this code of faith and conduct has certainly been salutary, and even spiritualizing. That is, he attributes to blood the evil tendencies and characteristics too often attributed to religion.

Christian'ity in China, Tartary and Tibet, a work by the Abbé Huc, published in 1857–8. It is a curiously interesting and elaborate history of the presence in the Chinese empire of Christian missions from the time of the Apostles to the end of the 17th century. The author

was a Roman Catholic missionary in China, 1840–52. By shaving his head, dyeing his skin yellow, and wearing a queue and Chinese costume, and by a thorough command of the Chinese language, he was able to travel not only in China Proper but in Tibet and Tartary. He published in 1850 an exceedingly interesting account of his travels during 1844-6, and in 1854 a work on the Chinese empire. His first work related marvels of travel which aroused incredulity; but later researches have amply shown that this was unjust. The final work, connecting the history of the Chinese empire with the maintenance through centuries of Christian missions, is a work of great value for the history of the far East.

Christians, Christian Connection, etc., the name of a denomination in the United States and Canada, adopted to express their renunciation of all sectarianism. They have become well known in all parts of the country, the number of their churches being estimated at over 1,000, with more than 250,000 communicants. Each church is an independent body: they recognize no creed, no authority in matters of doctrine: the Scriptures, which every individual must interpret for himself, are their only rule of faith: admission to the Church is obtained by a simple profession of belief in Christianity: speculative belief they treat as of little importance, compared with virtue of character. In New England they separated principally from the Calvinistic Baptists: in the southern States from the Methodists; and in the western from the Presbyterians. There was therefore at first a great diversity of opinion and practice among them, each church retaining some of the peculiarities of the sects from which it seceded. To maintain a connection between the different churches, one or more conferences are formed in each State, consisting of members delegated from each church. There are now more than 70 of these conferences, which again form, by delegation, the United States General Christian Conference. They have several periodical works, and several institutions of learning, Antioch College being the most celebrated. They consider Christ as the Son of God, miraculously conceived, whose death was a ratification of the new covenant, not a propitiatory sacrifice; and the Holy Ghost or Spirit as the power or energy of God, exerted in converting the wicked and strengthening the good. They hold to the inspiration and divine authority of the Bible, which they allow everyone to interpret for himself.

Christians of St. John, a sect of religionists found in Asiatic Turkey, chiefly in the neighborhood of Bassorah. They profess to follow the teaching of John the Baptist, and are wrongly called Christians since they reject Christ, and are practically heathens, whose deities are darkness and light. They are called also Mendeans, Mendaites or Mandaites, and Sabians.

Christians of St. Thomas, the name of a sect of Christians on the coast of Malabar, in southern India, to which region the apostle St. Thomas is said (by a tradition that has little to justify it) to have carried the gospel. The facts of their history are not well made out. They originally belonged probably to a body of Christians who, in the year 499, united to form a Syrian and Chaldaic Church in eastern Asia, and who were adherents of the doctrines taught by the heretic Nestorius. At an early date (7th century) the Persian Church had adopted the name of Christians of St. Thomas, and the Christians of Malabar received bishops from Persia. Latterly the Christians of St. Thomas gained the position of a military caste which locally had considerable power. When the Portuguese gained a position in Malabar these Christians were forced to join the Roman Catholic Church (1599). But in 1653 many of them renounced this union, and having in 1665 received a bishop sent by the patriarch of Antioch, they have since belonged to the Jacobite body of eastern Christians. The Church is now under seven bishops with a patriarch at the head; and the adherents number about 300,000. They give communion in both kinds, and in some other matters differ from the Roman Catholic Church. They allow the consecration of a married layman or deacon to the office of priest. Their churches contain no symbols nor pictures except the cross. Their liturgy is similar to the Syrian, and the Syrian language is used in it. At present they are, under the British government, free from any ecclesiastical restraint, and form among themselves a kind of spiritual republic, in which the priests and elders administer justice, using excommunication as a means of punishment. See 'The Indian Empire,' by Sir W. W. Hunter.

Christiansand, krĭs'tē-ān-sānd, Norway, a city in the southern part of the country, situated on a sandy plain. It was built by Christian IV. in 1641; and has been the capital of its province or stift since 1684. It has several dockyards, a good harbor, much used for refuge, and a considerable trade in timber, pitch, stockfish (salted cod), fish-oil for curriers, salmon, mackerel, and lobsters, the latter chiefly for the London market. Shipbuilding is a considerable industry. Christiansand has a cathedral and grammar-school, and is the residence of a bishop. The streets are wide, straight, and regular; the houses are built of wood and detached, presenting altogether a remarkably colonial appearance. The inhabitants are noted for their tall stature. Pop. 13,000.

Christianstedt, krĭs'tĭ-an-stĕt, Danish West Indies, a seaport in the island of Santa Cruz, situated on the north shore. The harbor is difficult of access, being encumbered with many shoals, one of which stretches out nearly two miles to seaward in a northeasterly direction. This city is the capital of the Danish West Indies. Pop. 9,600.

Christie, krĭs'tĭ, **Francis Albert,** American theological writer: b. Lowell, Mass., 3 Dec. 1858. He was educated at Amherst College and studied theology at the universities of Berlin, Heidelberg, and Marburg 1889-93. Since September 1893 he has been professor of Church history at Meadville (Pa.) Theological School. He has written on theological and historical themes for various periodicals.

Christie, James, English clergyman: b. Otterburn, Northumberland, 14 July 1837. He was the son of a Presbyterian pastor at Otterburn, whom he succeeded in the pastorate in 1862, and since 1870 has been pastor of the Fisher Street Presbyterian Church at Carlisle. He has held several important professional posts,

being moderator of the Presbyterian Church of England in 1901, and has published 'Men and Things Russian'; 'Northumberland'; 'The Moderator's Wander-Jahr.'

Christie, James Elder, Scottish artist: b. Guardbridge, Fifeshire, 5 Jan. 1847. He received an art training at South Kensington, and the Royal Academy. He was awarded a gold medal at South Kensington in 1875, and another from the Academy in 1877 for historical painting. Among important works by him are 'Tam O'Shanter' (1879); 'Pied Piper of Hamelin' (1881); 'A Lion in the Path' (1888); 'The Four Maries' (1889); 'The Red Fisherman' (1893); 'Gather Ye Rosebuds.'

Christie, Richard Copley, English scholar: b. Lenton 22 July 1830; d. Ribsden 9 Jan. 1901. He was educated at Oxford, studied law and practised his profession 1857–77. He was professor of political economy at Owens College, Manchester, 1854–66, and was chancellor of the diocese of Manchester 1872-94. After retiring from his profession he gave much time to bibliographical research, and besides contributing to the 'Dictionary of National Biography' he published 'Étienne Dolet, the Martyr of the Renaissance' (1880); 'Old Church and School Libraries of Lancashire' (1885); 'Letters of Sir Thomas Copley.' He gave to Owens College the Christie Library, opened in 1898, and at his death bequeathed his library of 75,000 volumes to the same institution. See 'The Athenæum,' 19 Jan. 1901.

Christie, William Henry Mahoney, English astronomer: b. Woolwich 1 Oct. 1845. He was a graduate of Trinity College, Cambridge, and for a long time assistant in the Royal Observatory of Greenwich. On the retirement of Airy (q.v.) as astronomer royal in 1881, Christie was appointed his successor, a position which he still holds. He has written a 'Manual of Elementary Astronomy' (1875), but is best known for his spectroscopic work with the Greenwich Equatorial, especially that relating to the motion of stars in the line of sight.

Christie Johnstone, a story by Charles Reade, published in 1855. The story, by turns pathetic and humorous, abounds in vivid and dramatic scenes of Scotch life by the sea.

Christina, krĭs-tē'na, queen of Sweden: b. Stockholm 9 Dec. 1626; d. Rome 19 April 1689. She was a daughter of Gustavus Adolphus, and her education was conducted in a masculine manner. After the death of Gustavus in 1632 the States-General appointed guardians to the Queen Christina, then but six years old. These were the five highest officers of the crown, who were intrusted at the same time with the administration of the kingdom. The education of Christina was continued according to the plan of Gustavus Adolphus. She learned the ancient languages, history, geography, politics, and renounced the pleasures of her age in order to devote herself entirely to study. In 1644 she took upon herself the government. A great talent for business, and great firmness of purpose, distinguished her first steps. She terminated the war with Denmark, and obtained several provinces by the treaty concluded at Brömsebro in 1645. She then, contrary to the advice of Oxenstiern, who hoped to gain, by the continuance of the war, still greater advantages for Sweden, labored to re-establish peace in Germany, in order to be able to devote herself uninterruptedly to the sciences and the arts of peace. France, Spain, Holland, and England sought her friendship. She promoted commerce by wise legislation, and patronized the learned and literary institutions. She declined to marry her cousin, Charles Gustavus, but induced the States-General in 1649 to designate him for her successor. In 1650 she caused herself to be crowned with great pomp, and with the title of king. From that time she neglected her ancient ministers, and listened to the advice of ambitious favorites. The public treasure was squandered with extravagant profusion. Distinctions were conferred upon the undeserving, and jealousy produced murmurs, complaints, and factions. In this state of confusion the queen declared her intention of abdicating the crown. The old ministers remonstrated with so much energy that the queen desisted from her resolution. She now grasped with more firmness the reins of government, and occupied herself again with study, bought paintings, medals, manuscripts, books, maintained a correspondence with many learned men, and invited several to her court. Descartes, Grotius, Salmasius, Bochart, Huet, Chevreau, Naudé, Vossius, Conring, Meibom, appeared in Stockholm, and the queen conversed familiarly with them on literary and philosophical subjects. But new troubles occurred; and Christina, who loved whatever was uncommon, resumed her determination to resign the crown.

In 1654 she assembled the States-General at Upsal, and in their presence laid aside the insignia of royalty to surrender them into the hands of Prince Charles Gustavus. She reserved to herself a certain income, entire independence, and full power over her suite and household. A few days after she left Sweden, and went to Brussels, where she made a secret profession of the Roman Catholic religion, which she afterward publicly confirmed in Innsbruck. From here she went to Rome, which she entered on horseback in the costume of an Amazon, with great pomp. When the Pope Alexander VII. confirmed her she adopted the surname of ALESSANDRA. In 1656 she visited France, where her dress and manners produced an unfavorable impression, but her talents and knowledge were generally admired. She offered to mediate between France and Spain; but Mazarin declined the offer, and succeeded in accelerating her departure from France under various pretexts. After the death of Charles Gustavus in 1660, the queen made a visit to Sweden, under pretence of wishing to arrange her private affairs; but it was soon perceived that she had other views. As the crown-prince was very young, she declared that in case of his death she should lay claim to the throne. This project was unfavorably received and she was compelled to sign a formal act of abdication. About this time she aspired to the Polish crown, but the Poles took no notice of her wishes. Finally she returned to Rome, where she passed the remainder of her life in the cultivation of the arts and sciences, giving way at times to fits of sensual indulgence. She was interred in the Church of St. Peter, and the Pope erected a monument to her with a long inscription. She had asked only for these few words: *Vixit Christina annos LXIII.*

Christina, Maria, queen of Spain, daughter of Francis I., king of the Two Sicilies, and mother of Isabella II., the dethroned queen of Spain: b. Naples 27 April 1806; d. Havre 22 Aug. 1878. She was married to Ferdinand VII. in 1829, and took an active part in the affairs of Spain from 1830 to 1854. As queen-regent she governed arbitrarily, and in 1854 she abdicated.

Chris'tison, Sir **Robert,** Scottish physician and toxicologist: b. Edinburgh 18 July 1797; d. 23 Jan. 1882. He was graduated in medicine at Edinburgh University in 1819, and subsequently studied in London and Paris. He was appointed to the chair of medical jurisprudence in Edinburgh in 1822, shortly after his return to Scotland, and in 1832 was promoted to those of materia medica and clinical medicine, but resigned them in 1877 and 1855 respectively. He was twice president of the Royal College of Physicians, president of the Royal Society of Scotland, and ordinary physician to the queen in Scotland. He was created a baronet in 1871. The most important of his published works is his 'Treatise on Poisons' (1829); but he also wrote 'Granular Degeneration of the Kidneys' (1839); and a commentary on the 'Pharmacopœias of Great Britain' (1842).

Christmas, the feast of Christ's birth, observed by the Christian Church annually on the 25th of December. It was, according to many authorities, not celebrated in the first centuries of the Christian Church, as the Christian usage in general was to celebrate the death of remarkable persons rather than their birth. The death of the martyr Stephen, and the massacre of the innocents at Bethlehem, had been already long celebrated, when, perhaps in opposition to the doctrine of the Manichæans respecting the birth of the Saviour, a feast was established in memory of this event in the 4th century. In the 5th century the Western Church ordered it to be celebrated forever on the day of the old Roman feast of the birth of Sol, though no certain knowledge of the day of Christ's birth existed. Among the German and Celtic tribes the winter solstice was considered an important point of the year, and they held their chief festival of Yule to commemorate the return of the burning-wheel. The holly, the mistletoe, the Yule log, and the wassail bowl relate more to paganism than to Christianity. In the East Christmas was celebrated on 6 January. As told in the Gospel of St. Luke, Christ was born during the night, and therefore divine service was performed in the night of 24-25 December, from which circumstance Christmas is called in German Weihnachten, a contraction of the old German ze wih nahten, on the holy or consecrated nights. The feasts of the martyr Stephen and the evangelist St. John were united with it, and a feast of three days' continuance was thus formed. In the ecclesiastical year this festival gives name to a period extending from the first Sunday of Advent to the feast of Epiphany, 6 January. In the Roman Catholic Church priests are allowed to celebrate three masses against the rule which prevails every other day in the year. In the Greek and Roman Catholic churches the manger, the holy family, etc., are sometimes represented at large. Most Christian churches celebrate this great festival in some way, and practically the entire community in Christian countries, including Jews and non-churchgoing people nominally classed with Christian populations, join in its social observance. In the United States, England, and other countries business is commonly suspended, although in Scotland this is only partially the case. The custom of making presents at Christmas is derived from an old heathen usage; but it has become consecrated by ages, and contributes greatly to make this festival an interesting event to families. The sending of Christmas cards by way of friendly greeting and remembrance has grown up within a period of some 50 years. The Christmas-tree has been traced back to the Romans. It went from Germany to Great Britain, and is almost universal in the United States, where the customs of so many nationalities meet and gradually blend into common usage.

Christmas-box, a box containing a present at Christmas; hence a Christmas gift. The custom of bestowing Christmas-boxes arose in the early days of the Church, when boxes were placed in the churches for the reception of offerings; these boxes were opened on Christmas Day, and their contents distributed by the priests on the morrow. In England the giving of Christmas-boxes led to the popular observance of what is called Boxing-day; that is, the first day after Christmas, when presents are made by the well-to-do to servants, messengers, and persons of humble condition.

Christmas Carol, a song in celebration of Christ's birth, sung especially at Christmas-time. Such carols, as well as many of a more secular but always joyous nature, have been long popular among the people of many nations. In France they are known as noëls, and various good collections of them have been published from time to time. Consult: Sandys, 'Christmas Carols, Ancient and Modern.'

Christmas Island, the name given to three oceanic islands, of which the most important is situated about 250 miles south by east of the western extremity of Java. This island, which is supposed to have been originally a coral atoll, and to have been raised by volcanic forces, rises to the height of nearly 1,600 feet, and is in shape an irregular quadrilateral of about 30 miles in circumference, having an area of about 20 square miles. It was annexed by Great Britain in 1888, and a settlement has been formed on it for the purpose of developing beds of phosphate.

Christiansund, krĭs'tē-ạn-sŭnd, Norway, a seaport on the northwestern coast, capital of the bailiwick of Romsdal, 82 miles southwest of Trondhjem, on three islands, or rather rocks, which enclose its beautiful land-locked harbor. The trade of the place is considerable, and the town itself is fast rising into importance. The principal export is dried cod, chiefly for the Spanish and Italian markets. From its singular position there are scarcely any regular streets in Christiansund, and the communication between one part of the town and another is kept up chiefly by water. The town was founded in 1734 by Christian VI. of Denmark. Pop. (1900) 12,050.

Christol'ogy, that branch of the study of divinity which deals directly with the doctrine

of the person and work of Christ. See CHRISTIANITY; JESUS.

Christophe, Henri, ŏn-rē krēs-tōf, king of Haiti: b. Grenada, West Indies, 1767; d. 8 Oct. 1820. He was an African slave who received his freedom as a reward of faithful service. On the outbreak of the negro insurrection in St. Domingo, 1801, he became one of its leaders, and attracted by his energy and ability the attention of Toussaint l'Ouverture, who conferred upon him a divisional military command. After the deposition of Toussaint, Christophe served under his successor, Dessalines, and waged a war of increasing ferocity against the French, who, in 1803, were compelled to evacuate the island. In 1811 Christophe obtained undisputed possession of a portion of the island, and had himself proclaimed as Henri I., king of Haiti. His reign was that of a sanguinary despot, occasioning ultimately a successful revolt of his black subjects, whereupon he committed suicide.

Chris'topher, Saint, a saint whose name and worship are celebrated, but whose history is little known. He is reported to have been a native of Syria or Cilicia, who was baptized by Saint Babylas, bishop of Antioch, and received the crown of martyrdom in Asia Minor about the middle of the 3d century. Relics of him are found in several places, principally in Spain. The Eastern Church celebrates his festival on 9 May; the Western on 25 July. His intercession was particularly sought in the time of the plague. Christopher literally means "bearer of Christ." He is represented as a giant, bearing the child Jesus upon his shoulders over a stream, which refers to a legend of this saint.

Christopher North, pseudonym of **John Wilson** (q.v.).

Christopher's, St. (commonly called St. Kitt's), West Indies, an island of the Lesser Antilles, 100 miles northwest of Guadeloupe, discovered by Columbus in 1493, 23 miles in length, averaging about five miles in breadth, and having an area of 65 square miles. It produces sugar, potatoes, tomatoes, yams, onions, and other vegetables, as well as pineapples, bananas, custard-apples, cocoanuts, and various other fruits. Mount Misery, the highest elevation, rises 4,100 feet. The flora and fauna are similar to those of the West Indies generally, among the latter being a species of small monkey. The climate is considered to be very healthy. This island is divided into nine parishes, Basseterre being the capital. It was colonized by the English in 1623. Pop. 31,000.

Christop'ulos Athana'sios, Greek lyric poet: b. Kastoria, Macedonia, 1772; d. Wallachia 29 Jan. 1847. He studied medicine, and the sciences at Budapest, and finally settled at Hermannstadt in Transylvania. An epicurean in every sense of the word, and unconcerned for the fate of his country, he lived only for the gratification of his appetites and celebrated sensual indulgences in his 'Erotika and Bacchika,' or 'Love and Drinking Songs,' which have been several times collected and printed under the title of 'Lyrika.' Though partly modeled upon Anacreon and the songs of Piron, Desaugiers, and other French authors, they display so much ease and simplicity, tenderness and grace, as to give their author a high place among the poets of his nation, and entitle him to the name of the modern Anacreon.

Christ's Hospital (generally called the Blue-coat School, from the costume of the pupils), a school in London, founded by Edward VI., for supporting poor orphans. There used to be from 1,000 to 1,200 boys and girls at this establishment receiving instruction, board and clothing, the girls being comparatively few in number. The ages varied from 8 or 10 to 15 or 16, five of the best scholars being sent each year to Oxford and Cambridge. An entirely new scheme of management came into operation in 1891, according to which the preparatory school (established in 1683 at Hertford) has 120 pupils, the boarding-school for boys 700, and the girls' school 350; a day-school for 600 boys, and another for 400 girls, being also provided for. New hospital buildings are being erected at Horsham. Entrance to the Hospital Schools is partly by nomination or presentation, partly by competition; and in regard to two thirds of the scholars, fees ranging from £10 to £20 may be charged if the parents or relatives are judged to be able to contribute to the child's education and maintenance. Numerous exhibitions and prizes still remain, including exhibitions to the universities. The great hall at Christ's Hospital is a splendid room of great size, and remarkable for some very fine pictures. Camden, Stillingfleet, Coleridge, Charles Lamb, and other distinguished men received their education at Christ's Hospital.

Christ's Thorn, a small thorny shrub of the order *Rhamnaceæ*, or buckthorn family. It is common in the southeast of Europe and Asia Minor, especially in Palestine. The fruit has a singular appearance, resembling a head with a broad-brimmed hat. The spines are long and sharp, growing on slender vine-like branches which are easily plaited, the flowers rose-shaped. The plant derives its name from its being believed by many to be the plant from which the crown of thorns was made which was placed on the head of our Saviour. The fruit is called jujube.

Christy, krĭs'tĭ, **Charles,** American minstrel: b. New York 1828; d. Kansas City, Mo., 13 Feb. 1897. He was an actor from boyhood, supporting Forrest and Macready as well as singing on the minstrel stage. He later became a theatrical manager.

Christy, Howard Chandler, American illustrator: b. Morgan County, Ohio, 10 Jan. 1873. He was educated in the public schools of Duncan's Falls, Ohio; went to New York in 1893 and since then has been continuously engaged in illustrating for the leading periodicals, 'Scribner's Magazine,' and 'Harper's Magazine' especially. Several collected portfolios of his drawings have lately been published.

Chro'mates. See CHROMIUM.

Chromat'ic, in music, a succession of semitones, ascending or descending. The chromatic semitone is the interval between any given note and that same note raised by a sharp or lowered by a flat. The chromatic scale consists of 13 tones, the 8 scale tones and the 5 intermediate. It is believed by some that the term chromatic was adopted because the Greeks were in the habit of designating the intermediate tones by characters of various colors.

Chromatin, krō'ma-tĭn, a substance in the nucleus of a cell which is readily stained by certain reagents, such as carmine, hæmatoxylin, and suffranin, so as to be distinguished from the other substance called achromatin or linin. This chromatin is made up of minute spherical or rod-like particles called "chromosomes." The latter bodies in the course of cell-division are of equal size in the same cell, and their number is the same in all the cells of all the tissues of the same species. The chromatin particles are of especial interest because they are supposed to be the bearers of heredity, and are thus supposed to form the physical basis of this unknown property of organic life. See HEREDITY.

Chromatophore, krō'ma-tō-fôr, a pigment cell. The possibility of change of color in the chameleon, frogs, the squid, etc., is due to certain cells in the cutis which are filled with pigment. These pigment-cells are called chromatophores, and under the stimulus of light may expand or contract. When expanded they are highly ramified, and when contracted are roundish. The pigment differs in different individuals and in different parts of the body, being yellow, brown, black, and at times even red or green. In the goby (a fish), the chromatophores, which are yellow or greenish-yellow when distended, become orange when contracted; while the orange or red ones, when shrunk, become brown or even black. In the same fish a still different kind of chromatophores are filled with iridescent crystals of marvelous delicacy, which in expansion become visible as spots of metallic sheen. It is on the distribution and different depth in the skin of the chromatophores that the pattern of markings of the skin of changeable animals depend. The common squid is very beautifully tinted, and under the microscope the chromatophores can be seen dilating and contracting, giving off a remarkable play of all the colors of the rainbow. The value of this power, which is under control, is that it gives the animal means of concealment by adapting its color to that of its surroundings.

Chromatrope, krō'ma-trōp, or **Chromotrope,** -mō-, a toy consisting of a disk painted with arcs of circles in brilliant colors in such a manner that when the disk is revolved centrifugal or centripetal streams of color seem to flow through it. The term is also applied to an attachment for a magic lantern, by which, on the revolution of two painted disks of glass, kaleidoscopic effects are projected onto the screen.

Chro'matype, a photographic picture in which the paper employed has been sensitized by some of the salts of chromium.

Chrome Green, the green oxide or sesquioxide of chromium, forming a green pigment used by enamelers. It is also employed by dyers and calico-printers as a mordant. A hydrated variety, $Cr_2O_3.2\,H_2O$, used for the same purposes, is known as "Guignet's green" or "emerald green." "Arnaudon's green" contains some phosphoric acid in addition. These are now used instead of the poisonous greens prepared from arsenic as a base. See CHROMIUM.

Chrome Iron Ore. See CHROMITE.

Chromic Acid. See CHROMIUM.

Chromite, or **Chromic Iron,** the only important ore of the metal chromium and the source of all of the chromium salts. Chemically considered, it is a chromate of ferrous iron $FeCr_2O_4$, but it is usually classified by mineralogists among the oxides of the spinel group as a compound of iron protoxide, with chromium sesquioxide, having the formula $FeO.Cr_2O_3$. The metals are often in part replaced by magnesium, aluminum, and ferric iron, as in the variety magnochromite from Silesia and mitchellite from Webster, N. C. The composition of the mineral thus approaches the chromiferous variety of spinel, picotite. Chromite has a hardness of 5.5 and a specific gravity of 4.32 to 4.57. It is usually a granular-massive, black, opaque, metallic mineral, much resembling magnetite. It has, however, a dark-brown streak and is readily distinguished from all black minerals by fusing it with borax and salt of phosphorus, the bead thus obtained assuming an emerald-green color on cooling. It is further identified by its invariable occurrence in serpentine or olivine rocks. It is often disseminated in grains, or rarely in small octahedral crystals, and thus upon the disintegration of the rock the grains are washed into the streams and adjoining bottom-lands. Prior to 1884 it was extensively mined near Baltimore, also at Texas, Pa., and in California, but the domestic production in 1902 fell to $4,567, while ore to the value of $582,597 was imported into the United States in 1902, chiefly from Asia Minor. The large deposits in Quebec, Yancey County, N. C., and in many other localities will no doubt be important sources of supply in the future.

Chromium, krō'mĭ-ŭm (Gr. χρώμα, "color," in allusion to the colors exhibited by its compounds), a metallic element discovered in 1797 by Vauquelin, in the native chromate of lead of Siberia, and afterward found combined with iron. The metal itself has never been prepared in large quantities, but it can be obtained by the reduction of the oxide by carbon in the electric furnace. It is also obtained by heating the anhydrous sesquichloride of chromium with zinc, potassium, or sodium. Chromium is extremely hard, of a grayish-white color, and less fusible than platinum. Its chemical symbol is Cr, and its atomic weight is 52.1 if O = 16, and 51.7 if H = 1. Its specific gravity is from 6.5 to 6.8, and its specific heat is about 0.1, though the latter constant has not been determined with precision. Once separated from oxygen, it does not readily combine with it again. It oxidizes superficially, however, upon being heated in air, and it decomposes steam at a red heat.

Chromium forms four different oxides, whose formulæ are respectively CrO (chromium monoxide); Cr_2O_3 (chromium sesquioxide); $CrO.Cr_2O_3$ (chromo-chromic oxide); and CrO_3 (chromium trioxide). Of these the first two act as bases, each yielding a series of salts with various acids. Those salts that are derived from the monoxide, CrO, are called "chromous" compounds; while those that are derived from the sesquioxide, Cr_2O_3, are called "chromic" compounds. Chromium sulphate, $Cr_2(SO_4)_3$, forms a series of alums with the sulphates of potassium and ammonium, the element behaving in this respect like aluminum. (See ALUM.) Chromo-chromic oxide is not chemically active. Chromium trioxide, CrO_3, dissolves in water with the formation of an acid, H_2CrO_4, which is called

"chromic acid," and is of great interest to the chemist. Chromic acid forms a series of definite salts that are known as "chromates." One of the best known of these is chromate of lead, $PbCrO_4$, which is used as a pigment under the name of "chrome yellow," and is formed by precipitating chromate of potassium by a soluble salt of lead. Potassium bichromate, $K_2Cr_2O_7$, or $K_2CrO_4CrO_3$, is another extremely important salt of chromic acid; it is used as a depolarizer in electric batteries, as a bleaching and oxidizing agent, and as a convenient starting-point in the manufacture of many of the chromium compounds. It possesses the peculiar property of rendering gelatine insoluble upon exposure to light, and for this reason it is used in various photographic processes.

Chromium is used to some extent in the manufacture of steel, as it is found that the addition of less than 1 per cent of chromium materially increases the strength, hardness, and elasticity of the product.

In medicine chromic acid and potassium bichromate are used. The acid is employed as a caustic; the bichromate is now rarely employed because of its irritant properties.

Poisoning by chromium compounds is similar to that caused by other metallic poisons. The drinking of battery fluid is the usual mode. There is severe gastro-enteritis, nausea, vomiting of yellowish bloody matter, diarrhœa, pain, colic, tenesmus, great prostration, muscular cramps, rapid and feeble pulse, bloody urine (perhaps suppression of this secretion), feeble and irregular breathing, with coma or convulsions preceding death. A fatal ending may occur in from 4 to 15 hours. At times this result may be delayed, and symptoms referable to degenerative processes in the liver and kidneys appear. Treatment is by prompt and continued washing of the stomach. Bismuth subnitrate is indicated in the after treatment, which is symptomatic.

Chromium, or Chrome Steel. See CHROMIUM.

Chromo-lithography, a method of producing a colored or tinted lithographic picture, by using various stones having different portions of the picture drawn upon them with inks of various colors and so arranged as to blend into a complete picture. Sometimes as many as 20 different colors are employed. It was invented by Alois Senefelder, of Prague, between 1796 and 1800. An outline drawing is first traced, and then transferred to the various stones, one for each color. The artist puts in the colors, with soap, of the tints required. Next the slab is put upon a press and carefully damped with a sponge, after which the oil color is applied with a leather roller. The parts of the slab which contain no drawing, being wet, resist the ink, while the drawing itself, being oily, repels the water while retaining the color. In printing, the lighter shades are printed off first and the darkest last. See LITHOGRAPHY.

Chromotype See CHROMATYPE.

Chro'mosphere, the gaseous envelope which exists round the body of the sun, through which the light of the photosphere, an inner envelope of incandescent matter, passes. During total eclipses it is observed that a red-colored envelope surrounds the sun, and shoots up to great distances from the surface. It seems to have been first recognized by Secchi; and the projecting portions of it are commonly described as "red-colored protuberances" and "red flames." To this red envelope the name "chromosphere" was given by Lockyer. The light from it is much fainter than that from the photosphere; and till 1868, when M. Janssen and Mr. Lockyer almost simultaneously pointed out a method of viewing it, it was never seen except during eclipses. See SUN.

The spectrum of the chromosphere was first observed in 1868 during the Indian total eclipse, and it was found to consist of a number of bright lines, and conspicuous among them those of hydrogen. The light of the chromosphere was thus proved to be due to vast flames or masses of incandescent vapor or gas, hydrogen forming a large part of the whole.

Since the invention of the Janssen-Lockyer method of observing, as it is called, very remarkable advances have been made in our knowledge of solar physics, discoveries quite unthought-of having followed. The observations are made by means of a combined telescope and spectroscope. A spectroscope is substituted for the eye-piece of the telescope, the slit of the spectroscope being placed at the principal focus of the object-glass of the telescope. The slit is capable of being moved in such a way that any particular band of the image formed by the object-glass of the telescope may be examined by the spectroscope. The spectroscope employed for the purpose of examining the chromosphere must have the greatest possible dispersive power, and requires for this purpose a very long train of prisms.

As was mentioned above, the spectrum of the chromosphere consists of a series of bright lines. The breadth of a bright line of the spectrum is not sensibly increased by increasing the dispersive power of the spectroscope, but the contrary is the case with a continuous spectrum, which is extended by dispersion. Thus the latter becomes weakened, while the former maintain their brightness and become more visible in comparison with the others. The slit of the spectroscope being aranged so as to take in a band, either tangential or radial, close to the edge of the image of the sun formed by the object-glass of the telescope, it is found that the bright lines of the chromosphere are perfectly visible, in spite of the light of the continuous spectrum proceeding from the inner portion of the disk. Further, it has been found possible, by using a spectroscope of the very highest dispersive power, and by opening the slit sufficiently wide, to see the whole of one of the protuberances at once, and by this means to watch its motions and its changes. To understand this the reader must consult the article SPECTROSCOPE. He must recollect that a continuous spectrum consists of an enormous number of images of the slit, placed side by side, and in ordinary cases slightly overlapping each other. If we could employ an infinitely narrow slit we should have an infinite number of infinitely narrow images, and no overlapping whatever. But suppose a light to consist of only two or three colors, say light from a source capable only of giving the two bright lines C and F, that is, one in the red and another in the blue part of the spectrum. It is

easy, even with a slit of sensible width, to keep the two from overlapping, and we shall see without any confusion the two bright lines or bands at different parts of the spectrum, darkness intervening. Now imagine a flame or tongue of fire starting up from the sun's surface, and let the spectroscope be directed on its image in the telescope; there will be only portions of the slit illuminated by it, portions corresponding to the shape of the flame; and if the flame contain only light of the bright line C and F, there will be seen two images of the flame at the points of the spectrum belonging to these colors. The observations of these flames by Mr. Lockyer has furnished us with what may be considered at present as a very complete knowledge of the atmosphere of the sun, though doubtless there is yet much to be discovered by the daily observation of them that is now carried on; and the same method applied to the sun's spots has proved not less fruitful. We can give only a few of the results here, but the reader will find an account full of interest in Mr. Lockyer's papers communicated to the Royal Society, and printed in abstracts in the Royal Society's 'Proceedings' for 1869 and 1870. He will also find in the 'Proceedings' for the same date an account of the experiments of Frankland and Lockyer on gaseous spectra, undertaken with the view of determining some questions of great importance relating to phenomena observed in the course of the researches under consideration. Latterly, by methods specially devised, excellent photographs of the protuberances or flames have been obtained.

The chromosphere and its prominences, when examined with the telespectroscope (as the instrument just described is called) exhibits, as we have said, a spectrum of bright lines, due to incandescent gases. The most elevated portions consist entirely, or almost entirely, of hydrogen, the lightest of the gases. Lower down are found the gases or vapors of the heavier metals,— of sodium, magnesium, barium, iron, and others. The lower the layer of the chromosphere examined, the more dense is the spectrum filled with lines of metals, and in the prominences the red hydrogen flames tower high above all.

From minute displacements of well-known lines in the spectrum (see SPECTRUM ANALYSIS) motions are inferred of the incandescent bodies from which these lines are proceeding. On this principle motions of the fixed stars have been determined. Thus Sirius is receding from us at the rate of 20 miles per second, while Arcturus is approaching us at the rate of 50 miles per second. The principle applied to the results of the spectroscopic examination of the prominences of the chromosphere shows that they are due to enormous outbursts of gases and vapors from the sun. These gases are projected outward with extraordinary velocity, and in their neighborhood vast cyclones are observable. It is also proved by applying the same principle that the spots on the sun's surface are due to, or at least are accompanied by, vast up-rushes and down-rushes of gaseous matter.

Chron'ic (Gr. *Χρόνος*, "time"), a term applied to diseases which are of long duration, and mostly without fever. It is used in opposition to the term "acute," which is applied both to a pungent pain and to a disease which is attended with violent symptoms, terminates in a few days, and is attended with danger. On the other hand, a "chronic" disease is slow in its progress and not so generally dangerous.

Chron'icle, a history recounting in order of time all details which observation or tradition has furnished the author. It may be a universal history, or may deal with a single epoch, nation, city, or individual. Some chronicles have been preserved from early ages; the Old Testament Chronicles (q.v.) are a type of such. An important ancient chronicle, discovered on the island of Paros in 1627, and known as the 'Chronicle of Paros,' is an outline of Greek history, originally covering the period from the reign of the legendary Cecrops, king of Athens (1582 B.C.) to 264 B.C. The last part, from 355 B.C., is now lost. It omits many important political and military events, and deals more fully with the art and festivities of the people. In the early Christian ages, ecclesiastics were generally the authors of the chronicles; for example, Eusebius, bishop of Cæsarea, collected from other historical works his 'Chronicle of Ancient History.' Hieronymus of Stridon translated it into Latin in the 4th century, and other continued it. Many historical works of the Byzantine historians are also chronicles. Most of the mediæval chronicles were by monks, especially by the Benedictines, who usually began their story with the creation of the world, and gave an abridged history of the events from the first chapter of Genesis to the immediate subject of their narrative. In their statement of facts they in general knew little distinction between fabulous and true history, were not inclined to question much either visions or miracles, and were accustomed to dwell as long on unimportant as on momentous events. Chronicles are valuable for determining historical facts when, like that of Eusebius, they contain materials from older works which are now lost, or when they relate events contemporary with a writer, and of which he was a witness; and they are always valuable as an illustration of the spirit of an age and the sentiments of a people. It is through them that nearly all the history of the Middle Ages has been preserved. Every European people has numerous mediæval chronicles.

Among the German chronicles may be mentioned that of Regino, abbot of a monastery in the forest of Ardennes, whose work extends from the Christian era to 907; that of Hermannus Contractus, entitled 'A Chronicle of the Six Ages of the World,' to the year 1054; that of Lambert von Aschaffenburg, which recounts the period from the beginning of the world to 1050 in brief, and from 1050 to 1077 in detail; that of Godfrey of Viterbo, giving a universal history to the year 1186, written partly in prose and partly in verse, and entitled 'Pantheon'; and a chronicle found in the collection of Pistorius, composed by an Augustinian monk, which extends from the Christian era to 1474. These were written in Latin and, with many other Latin chronicles, were col-

lected and published at Hanover in a series of volumes entitled 'Monumenta Germaniæ Historica.' The oldest historical book in the German language is a rhyming chronicle, consisting of 83,000 verses, written by Ottokar von Horneck, in the 13th century, and of nearly the same antiquity are the chronicles of Rudolf von Ems and Jansen Enekel, both having the form of poems, and furnished with notes by their authors. France is rich in chronicles, universal and particular, written in Latin, French, and various provincial dialects. It was the fancy of the earliest chroniclers to give to France a Trojan origin. Eginhard, the son-in-law of Charlemagne, chronicled the deeds and talents of that emperor in his 'History of Charlemagne.' The first of the chroniclers who wrote in the popular language of France was Geoffroi de Ville-Hardouin, who lived in the 12th century, and was an actor in the events which he describes. The 'Chronicles' of Froissart (q.v.) embrace the events occurring from 1325 to 1400 in England, Scotland, France, Spain, Brittany, and the Low Countries, setting forth in detail the feasts, spectacles, and all the pageantry, of feudal times, and enlivened throughout by Froissart's shrewd comments and observations. Of the strictly English chronicles, the earliest is that by Geoffrey of Monmouth, a monk of the 12th century, tracing the history of Britain through a series of imaginary kings, from Brutus, a son of the Trojan Æneas, who founded the British state many centuries before the Christian era, to Cadwallader, who was said to have lived 689 A.D. There is also the 'Anglo-Saxon Chronicle,' extending from the beginning of the Christian era to the death of King Stephen (see ANGLO-SAXON LITERATURE). The collection of chronicles edited by Holinshed in 1577 embraces a history of England to that year, a history and description of Ireland by Stanihurst, and a history of Scotland translated by Hector Bœthius. 'The Chronicle of the Kings of England,' by Sir Richard Baker, published in 1643, is a history of England from Roman times to the death of King James I. It was a very popular work, and was afterward continued to the death of George I., but is not now considered accurate history.

Chronicle of the Kings of England. See CHRONICLE.

Chronicle of Paros. See CHRONICLE.

Chronicles, Books of, the last of the historical books of the Old Testament, forming only one book in the Hebrew canon. Its arrangement after the Books of Kings, and its division into two parts, is the work of the Septuagint (q.v.). The Hebrew name means "words," or, rather, "acts of the days," and is thus much the same as our "journals" or "annals." The title given to it by the Seventy was "Paraleipomena," meaning either "remains" (of other historical works), or "things omitted." The usual and very appropriate name "Chronicles" was given to it by Jerome. According to its contents the book forms three great parts: (1) Genealogical tables interspersed with geographical, historical, and other remarks (1 Chr. i.–ix.). (2) The history of the reigns of David and Solomon (1 Chr. x.–2 Chr. ix.). (3) The history of the kingdom of Judah — excluding that of Israel — from the separation under Rehoboam to the destruction of the Jewish state by the Chaldæans (2 Chr. x.–xxxvi.), with a notice in the last two verses of the permission granted by Cyrus to the exiles to return home and rebuild their temple. The Chronicles accordingly traverse nearly the whole field of Old Testament history, and present many points of contact with the earlier scriptures, historical and prophetical, more especially, however, with the books of Samuel and of Kings. How far the author of the Chronicles may have made use of these books cannot be determined, but that he did not solely rely upon them is evident from the number of titles of books referred to by him as authorities, sometimes on matter not contained in Samuel and Kings, or, if mentioned in them, yet with greater brevity than in the Chronicles. A considerable portion of the matter contained in the Chronicles is much the same as that in Samuel and Kings, but many particulars recorded in these books are entirely passed over, while others are more fully related in the Chronicles. A certain quantity of matter also is peculiar to the Chronicles. That these books form one of the latest compositions of the Old Testament cannot admit of doubt. Its reference, already mentioned, to the decree of Cyrus respecting the restoration is sufficient evidence of this. With regard to the author there is not the same certainty, but strong arguments can be adduced to prove that Chronicles and the Book of Ezra are by one hand, and a common opinion is that Ezra was the author of both.

Consult Movers' 'Kritische Untersuchungen über die Biblische Chronik'; Keil, 'Apologetischer Versuch über die Chronik'; and the commentaries of the German writers, Bleek-Wellhausen, König, Wildeboer, etc.

Chronicles of the Canongate, a collection of Sir Walter Scott's stories published in two series. The first series (1827) contains 'The Highland Widow,' 'Two Drovers,' and 'The Surgeon's Daughter'; the second series (1828) contains 'The Fair Maid of Perth.'

Chronicles of Clovernook, a story by Douglas Jerrold, published in 1846. Clovernook is a "hamlet wherein fancy has loitered away a truant hour"; and under the guidance of the "Hermit of Bellyfulle" the author explores Clovernook, and discourses of it. The book charms by its quiet humor, the grace of its fancy, and the benevolence which characterizes even its satire.

Chronicles of Froissart. See CHRONICLES.

Chronicles of the Schönberg-Cotta (shĕn'-bĕrg kŏt'tä) **Family,** a novel by Mrs. Elizabeth Charles, published in 1863. It is the story of a family during the period of the Reformation in Germany, as told chiefly by Friedrich and Else, the oldest children. The book is written with an effort after the archaic style, and has much of the simplicity and directness of the old chronicles. It is interesting and has proved a great favorite, though accurate scholarship finds fault with its history.

Chron'ogram, a device by which a date is given in Roman numerals by printing certain letters of an inscription larger than the others; as in a motto of a medal struck by Gustavus Adolphus in 1632: ChrIstVs DVX; ergo trIVMphVs. The value of C and the other capitals equals 1632, MDCXVVVVII.

Chronograph, krŏn'ō grăf, the name given to various devices for measuring and registering very minute portions of time with extreme precision. Benson's chronograph is, in principle, a lever watch with a double seconds hand, the one superimposed on the other. The outer end of the lowermost hand has a small cup filled with a black viscid fluid, with a minute hole at the bottom, while the corresponding end of the uppermost is bent down so as just to reach the hole. At the starting (say) of a horse race, the observer pulls a string, whereupon the bent end of the upper hand passes through the hole and makes a black mark on the dial, instantly rebounding. Again, as each horse passes the winning post the string is redrawn and a dot made, thus marking the time of each horse. This chronograph registers to one tenth of a second. Strange's chronograph is connected with the pendulum of an astronomical clock, which makes a mark on a sheet of paper at the beginning and end of each swing. By touching a spring on the appearance (say) of a particular star on the field of a telescope, an intermediate dot is made, and by measuring the distance of this from either of the extremes, the exact time can be ascertained to 1-100 of a second. Schultze's chronograph, in which electricity is applied, is yet far more precise, registering time to 1-500,000 part of a second.

Chronol'ogy, the science of dates, or of arranging events in order of time. Two steps in human progress were requisite for its existence: the invention of material records, since memory would not transmit exact sequences of events on any considerable scale; and the adoption of some recurrent astronomical period, neither too short nor too long, as a measure of time. The pictograph, developed into a system of writing, and the Peruvian quipu, or knotted cord, are the chief of the former. The fixing of the year by the Babylonian astronomers was the only feasible specimen of the latter: the month being too short for a measure of long periods, and even the year becoming too formidable in numbers for the limited counting power of the ancients. Between the creation of these raw materials, however, and the construction of a simple and universally applicable system for even one country, thousands of years elapsed in which the chaos of unsystematic systems is still the difficulty and often the despair of antiquarians.

For a satisfactory chronology there is a third requisite,—a fixed epoch to count from, no matter what: as in Babylonia the accession of Nabonassar; in Greece the hypothetical institution of the Olympian games; in Rome the imaginary foundation of the city; in Christendom the arbitrarily fixed birth of Christ; with the Mohammedans the Hegira of the Prophet, etc. But, obvious as this seems, it is in fact a very late device of civilization. Herodotus and Thucydides, in the most splendid intellectual age of Greece, wrote history without a date, or any apparent recognition that one was needed. The sequence of events was preserved; but that these need be related to an arbitrary point in the past is an artificial conception, created by the accumulation of practical inconveniences. These would seem to have differed in each country which independently invented it: the scientific and business ones in Assyria, historical in Greece, administrative in Rome. Others borrowed the system when its utility was manifest; but older societies were satisfied with a ruder scheme. Their science and business was alike undeveloped; their historical sense was satisfied with a few dramatic episodes, and even the order of events was heroically confounded; and when it became necessary to keep public records, their unit was a reign, or they dispensed with units altogether and dated by some notorious event. Thus the Babylonians dated their business and official tablets "the year he brought Nannar of Nippur into a house," "the year he overran Karkhar," "the year he overran Karkhar a second time," "the year divine Bur Sin became king, etc.; on exactly the same principle as a modern mother dates events in the year the second child had the measles. Dating by the year of a certain king's reign is a natural system, still preserved in English statutes: they are not the laws of 1663 or 1860, but "4th Car. II.," "24th Victoria," etc.

In Assyria, as early as the 14th century B.C., a system was begun of dating by "eponyms," or the names of the chief officers of state, in annual succession, with the chief events in the year; each new king's name being entered on his accession. Thus: "Edsur-sarabe governor of Gozan. Revolt in city of Ashur. In month Sivan sun was eclipsed." (Three intervening entries.) "Pan-ashur-lamur governor of Arbela. Revolt in city of Gozan. Pestilence." In Rome, it was "in the consulate of" certain persons; in Athens, "in the archonship of"; and so on. Obviously, if the regular succession of functionaries is preserved for a long time, as in Assyria it was for centuries, it will furnish a perfect chronology provided one date can be fixed in the series. This has been done in several cases, and the chronology of some sections of ancient history has been accurately reconstructed over long periods. The most certain authentication is by some astronomical phenomenon whose date can be fixed by calculation; and several of these priceless data are casually mentioned by old records or historians. Thus, the mention by an Egyptian papyrus of a rising of Sirius, in connection with the overflow of the Nile, fixes the accession of Usertesen III., fifth king of the 12th dynasty, between 1876 and 1873 B.C.; the oldest certain year-date or approximate date in history yet discovered, and by a happy chance, in a country the most empty of chronological data. (The accuracy of Naram-Sin's date as near 3750 B.C. is still a battle-ground.) The most usual of these phenomena recorded are eclipses of the sun, from the terror inspired by the darkening of the sky; fortunately for history, as the mention of them has furnished several invaluable dates. The Assyrian eponym canon for several centuries has been fitted with accurate dates by the eclipse recorded in the first entry above, 763 B.C.; the same one is mentioned in the Bible (Amos viii. 9) as occurring in the reign of Jeroboam II. Even when we cannot be certain by itself which eclipse was meant, it is rare that other synchronisms do not fix the limit. Thus, an important date in the kingdom of Lydia is determined by an eclipse which was either 610 or 585 B.C., and other circumstances make the latter date probable.

When positive evidences fail, the only method of research is by *synchronism*, or fixing the date of an event by its connection with some

other event or person of known date. Fortunately, the records afford considerable help in this, if less than could be wished: they mention international battles, captures, treaties, appeals, threats, correspondence, etc., where one date must apply to both. Noted examples of this are the biblical records as to relations of Palestine with Assyria, Egypt, Tyre, etc.: sometimes confusing events and dates, occasionally confounding persons, and needing correction from other sources, but still of extreme value. Another specimen is the Assyrian "synchronous history" of the relations between Assyria and Babylonia, a tablet of about 800 B.C. When we come down to classic times, these synchronisms are the very basis of historical work on those periods. There is also a synchronism of arts, products exchanged between countries, systems of writing, etc., and even to some extent of institutions; which, though demanding expert knowledge and careful judgment, is often of the first value. On this basis much of the Homeric and pre-Homeric history of Greece is taking shape, and even the origins of China can perhaps be related to Babylonia.

The chronological sense of different races presents extreme diversities; but it is fairly accurate to say that none of the older ones had any appreciable amount except the Babylonians, and that in them and their pupils, the Assyrians, it was early and remarkably developed. Their dated records (in the primitive fashion above) go back to the third millennium B.C. at least; the Assyrians eponym canon antedates by many centuries any similar attempt elsewhere; and the Babylonians were much the first to adopt an epoch. On the other hand, their co-founders of the earliest civilization, the Egyptians, were utterly destitute of it; and the dates in their history back of the time of close contact with Babylonia, where synchronism can be utilized, are almost pure guesswork. Beyond 2000 B.C. the divergences of estimated Egyptian dates among the most authoritative scholars vary from 500 to 1,500 years, and even down to 1500 B.C. there is often 100 or 200 years' difference; and only the vaguest inferential proof is available. The Hindus, the Chinese, the Jews, the Greeks, were nearly as devoid of chronological instinct. The case of the great Greek historians has been mentioned; and the vague Jewish "forty years," for a generation or an indefinite long time is familiar and not conducive to accurate chronology.

The obscurity due to lack of dates in general was of course enhanced by the fact that each state counted from its own events or persons, so that in place of one problem, the historical antiquary has scores. The chief method — for many ages the only one — by which this Babel of chronologies was finally reduced to uniformity over large areas was political absorption and the disuse of provincial systems. Even when fixed epochs came to be adopted, though the continuity of history was assured, the international confusion was not lessened nor comparative chronology made easier, as each selected a different epoch; and the same remedy only was operative here. Nor, indeed, for some time did even the individual system become the accurate instrument of research it is now; for the succession was not at first of years, but of annual magistrates, as with the Assyrians, Athenians, and Romans, sometimes more vaguely of kings and priests. Moreover, with one dubious exception the date of the epoch was not that of its adoption, but centuries back; and the dates affixed by the new system to former events were often wildly fanciful, as was that of the very event which furnished the starting point. The first epoch ever used, so far as known, was the accession of Nabonassar of Babylonia 747 B.C.; it is generally believed to have been used from the beginning, but this is less probable now than formerly. The Roman era was the foundation of Rome, somewhere about 750 B.C. according to Roman writers; it is not known when it was first adopted, but probably not before the 2d century B.C. The Greek reckoning was from the alleged foundation of the Olympic games in 776 B.C., quite as apocryphal as the other; it was first used as a basis of calculation by Timæus of Sicily in the 3d century B.C. It furnishes a scientific one when the year of the Olympiad is mentioned, which is not always, so that a margin of three years is left. Note the curious fact that all three epochs begin within a quarter century or so of each other, though the last two are merely guesswork. It seems incredible that the year, apparently the most simple and obvious of natural units, was first suggested and used in 194 B.C. by Eratosthenes, the great Greek editor, mathematician, geographer, and chronographer. Of course it had been employed for thousands of years as a unit within other units, such as reigns, but not alone in sequence from a fixed epoch. The Olympiad, however, for reasons given below, held its own till the middle of the 5th century. Even after the official adoption of the Christian era,— which, like its predecessors, antedated its use by centuries,— centuries elapsed still before it was employed to the exclusion of other systems. Many other methods of dating, local or ecclesiastical, flourished beside it, and made nearly as much labor necessary in modern as in ancient times to synchronize dates. An acquaintance with these is indispensable to the study of the chronicles, charters, and other legal and Church documents of the Middle Ages.

Still another cause of the imperfection of early chronological methods was the difficulty found by the masses in grasping large numbers. Hence, it became the practice to divide the time into cycles of a small number of years, and number by the years in a cycle. The Olympiad was a refined form of this. Our own system of reckoning by centuries is another, only by its decimal form it expresses both ideas at once. Instead of saying "the 3d year of the 20th century," as "the 3d year of the 40th Olympiad," we say a term of addition, and say "nineteen hundred(s) and three." The Chaldæans had their saros of 6,585⅓ days, or 18 years; the Romans, their indiction of 15; and the Chinese and other Asiatic nations still use a cycle of 60. The European cycles, however, as the metonic of 19 years still used for computing Easter, were mostly used to regulate the calendar rather than to compute dates; but they are often extremely useful as an additional method of verifying these.

Babylonian: Era of Nabonassar.— This prince seems for a very brief time to have thrown off the Assyrian yoke and restored Babylonian independence. It was almost immediately lost; but he succeeded in imposing a new dating system which convenience main-

tained, or else later gratitude looked back to him, under the glories of Nabopolassar and Nebuchadrezzar, as the pioneer of Neo-Babylonian greatness. At any rate, the era is fixed at 26 Feb. 747, from astronomical data collected in Chaldæa by Callisthenes, a general of Alexander the Great. It is the basis of the once famous Canon of Kings, or Mathematical Canon, preserved in Ptolemy's works, and previous to the era of archæology our one source of Mesopotamian history. The Alexandrian Greeks also used this era till their adoption of Julius Cæsar's reformed calendar, 25 B.C. The Babylonian year was different in length from the Julian of 365¼ days, and the conversion of Nabonassar years into years B.C. is a matter of delicacy, necessitating a knowledge of the month and day for certainty. Tables have been drawn up for this purpose.

Olympiads.— It is now pretty generally admitted that the early lists of victors in the Olympic games are fictitious, and that the foundation of the games cannot be assigned a date, our first authentic knowledge beginning with the 6th century B.C.; but this is indifferent to the method of calculation which assumes a beginning in 776 B.C. They were celebrated every fourth year in the summer solstice; and as the Olympic year began sometimes with the full moon before and sometimes with the one after the solstice, to save trouble and perpetual recomputation it was reckoned as beginning the 1st of July. Hence, the Olympic years cannot be synchronized with ours year by year; the second half of the one corresponds with the first half of the other, and the month must be known for accurate conversion. Therefore, in years before Christ, when the event happened between January and June, inclusive, subtract the number of the Olympic year from 776. Thus: the oligarchy of the Four Hundred was deposed in June Ol. xcii. 1: $4 \times 91 + 1 = 365$; $776 - 365 = 411$ B.C. Socrates was executed in May Ol. xcv. 1: $4 \times 94 + 1 = 377$; $776 - 377 = 379$ B.C. If it took place in the latter part of the year (as did the immense majority of the familiar incidents in Greek history — all the great battles, for physical reasons, the deaths of Pericles and Cleon, etc.), subtract the sum as aforesaid from 777. Thus, the battle of Platæa was fought in September Ol. lxxv. 2: $4 \times 74 + 2 = 298$; $777 - 298 = 479$ B.C. If the year is after Christ, subtract the number of the Olympic year from 776 in the first case, from 777 in the second. The Olympiad was only used by historians; it is never found on coins or inscriptions. A new Olympiad was instituted by the Roman emperors, beginning with 131 A.D., and is used on some coins and inscriptions, but struck no deep root.

Macedonian Era, or Era of the Seleucidæ: also called by the Jews *Era of Contracts*, because their Syrian governors compelled them to use it in civil business, and styled by the writers of the Books of Maccabees the *Era of Kings.*— This epoch dates from the foundation of the Syro-Mesopotamian monarchy by Seleucus Nicator, Alexander's general; assumed to begin with his occupation of Babylon 311 B.C., 12 years after Alexander's death. It was used not only in the Seleucid empire, but by the Greek states on the east coast of the Mediterranean generally; was followed by the Jews till the 15th century, and is said to be in use by some Arabians even yet. It was the great Eastern date for many centuries; but it is one of the most difficult to convert into terms of Christian years, from the astonishing variety in the beginnings of the year (which in different countries and among different sects varied from the vernal equinox to 28 October), and from the variation in length of year, some using the Egyptian year of 365 days, some the Julian of 365¼. The usual computation is to place the beginning of 312 Seleucid on 1 September in the Julian year preceding the first of our era. Therefore, to reduce a Seleucid date to ours, subtract 311 years 11 months.

Era of Alexander.— This is used by some Greek historians, dating from his death 325 B.C.

Era of Tyre.— This begins 19 Oct. 126 B.C. To reduce it to our era, subtract it from 126 if B.C., subtract 125 from it if A.D. This date is used only on medals and in the acts of some councils.

Era of Rome.— The date of the foundation of Rome, as related to the Olympiad epoch, is differently assigned by different authors: by Fabius Pictor at Ol. viii. 1, autumn (747 B.C.); by Polybius at Ol. vii. 2 (750); by M. Porcius Cato at Ol. vii. 1 (751); by Verrius Flaccus at Ol. vi. 4 (752); by Terentius Varro at Ol. vi. (753). As all the dates were figments, each Roman writer followed which he chose, and sometimes varied from one to another. Livy generally follows Cato, sometimes Fabius Pictor; Cicero follows Varro, as does Pliny, in general; Dionysius of Halicarnassus follows Cato. The modern writers usually follow Varro, supported by Censorinus, who specifically says the festival of the Palilia in April was the anniversary of the foundation. The Romans had two kinds of year: one for business, public or private; and the consular year, which their annalists follow. The former began with the calends of January. The latter had no fixed time of beginning, but commenced with the installation of the consuls, which happened as chance and politics dictated; it is the one generally used by the Latin and Greek historians down to the 6th century A.D., however. But in the computations of the Roman era the year begins with 21 April. After Cæsar's regulation of the calendar, the year began with January, much to the disgust of the Roman poets, who thought the spring was the real beginning, as, of course, it is.

Cæsarean Eras.— Several attempts were made to establish time eras from actions of Cæsar and Augustus, one of them very successful. The *Cæsarean Era of Antioch* commemorated Cæsar's victory at Pharsalia 48 B.C.; it was used by Evagrius in his 'Ecclesiastical History.' The Syrians and Greeks, however, placed its beginning 11 months apart. The Julian Era began 1 Jan. 45 B.C., and commemorated the reformation of the calendar by Cæsar. The *Era of Spain* or *of the Cæsars* commemorated the completion of the conquest of Spain by Augustus, and began 1 Jan. 40 B.C.; for many centuries it was the one era of Spain and Portugal, and generally of the Roman provinces subdued by the Visigoths, not only in the Iberian peninsula, but in southern France and in Africa. Several of the councils of Carthage, and that of Arles, also dated from this, though after the 9th century the year of the Incarnation was usually joined with it. It was not disused in Castile till 1382, and in Portugal not altogether till 1422 or later. The calendar being Julian,

all its dates are reduced to ours by merely subtracting 38. There was an *Era of Actium,* commemorating that battle, fought 3 Sept. 31 B.C. The Romans began it 1 Jan. 16 Julian (30 B.C.); the Egyptians, 29 August; the Eastern Greeks (who used it till the 9th century), 2 September. The latter called it the *Era of Antioch* (not the one mentioned later), and that city struck medals with it. There was also an *Augustan Era,* beginning 27 B.C., the year in which Augustus received that title.

Jewish Eras.— The Jews came under foreign rule before they had invented an epoch, or even developed periodic magistrates; and their annals, except for synchronisms, are nearly as baffling as the Egyptian. Their first internal chronology is after the Macedonian era was forced on them by the Seleucid officials; their religious matters, however, were regulated by their own calendar, in which the civil and sabbatical year began (as now) about the autumnal equinox, the ecclesiastical and legal year about the spring equinox. They also made computations of the time from the Creation (see paragraph below), but their dates do not depend on it till modern times. After the Dispersion they were obliged to conform to the periods of other nations, in order to have their festivals celebrated uniformly; and they adopted a cycle of 84 years (a transformed Greek cycle). The time of its beginning is not certain, one author placing it at 162, and another at 291 B.C. In 46 B.C. the Christians adopted it, and used it partially till the Council of Nice; they then, and the Jews in 360 A.D., substituted the metonic cycle of 19 years, which the latter still employ. Till the 15th century they continued to date from the Macedonian era; since then they have adopted a Creation era, which they date 3,760 years 3 months B.C. Their dates cannot be reduced to ours without expert knowledge of their involved calendar.

Creation Eras.— To emphasize their separation from paganism, and avoid participation in pagan observances connected with the calendar, the Christians early began to reckon time from the supposed date of the creation of Adam according to the Jewish Scriptures. Aside from its resting only on the adding up of impossible and inconsistent genealogies, the problem was further confused by there being three texts of equal authority to work from,— Hebrew, Samaritan, and Septuagint,— all irreconcilably variant. One author collects 120 different computations of the true date; another says he has collected over 200; and 300 have been reckoned; and the estimates vary over 3,500 years, from 3,483 to 6,984 years before the Christian era. None of them have any scientific standing, but for two centuries the Christian world generally accepted as a working hypothesis Archbishop Usher's (1650) figure of 4004 B.C., which is still used in some Bible appendices and similar works. Several earlier ones, however, obtained considerable footing, and two of them are not yet disused. It is of course as useful as any other arbitrary point, like the Olympic Games or the foundation of Rome; and has the advantage of requiring only one continuous figure, in place of a break in the centre like the Christian era. But its controversial character, and the satisfaction of marking off the time after Christ's coming as the beginning of a new era, have caused the latter system to supplant it. Of the others, the chief are: (1) *Era of Constantinople,* still employed in the Greek Church, and used by the Russians till the time of Peter the Great. This begins 5,508 years 4 months before the Christian era. The civil year begins 1 September; the Church year on the spring equinox or 1 April. To find the current year corresponding to a Constantinople year, if the event took place before 1 September, subtract 5,508 from the date; if later in the year, subtract 5,509. (2) *Era of Alexandria.* This was adopted by the Christians of Alexandria on the computation of Julius Africanus, who reckoned 5,500 years from the creation of Adam to the birth of Christ, but placed the latter three years earlier than the current reckoning, so that our era would begin 5503 Alexandrian. After the accession of Diocletian in 284, however, they dropped 10 years, both from the year since the Creation and since the Incarnation, making in fact two eras instead of one. To convert this era into our own, in the first 8 months of the year subtract 5,502 up to and including 5786 Alexandrian, after that date, 5,492; in the last 4 months, 5,503 and 5,493, respectively. This era was used by the Coptic Church till the 15th century, and is still retained in the Abyssinian. (3) *Era of Antioch.* The Syrian Christians, early in the 4th century, adopted Julius Africanus' reckoning as above, but dropped 10 years from it as the Alexandrians had already done; placing the Incarnation, however, as in our own era, three years later than the Alexandrian. As regards the Creation, therefore, the two eras are seven years apart up to Diocletian's time, and then coincide; as regards the Incarnation, the Antioch is three years less before that time and seven years later after it. Dates in this system are reduced to ours, as in the reformed Alexandrian calendar above.

Era of Diocletian, subsequently named Era of Martyrs.— At the same time that the Alexandrians changed their Creation era as above, they established a new and shorter one from the accession of Diocletian, 29 August (first of the Egyptian year) 284. The second name given implies that an attempt was made to start it from 303, the date of Diocletian's edict of persecution, but if so it was unsuccessful, as indeed a mere perpetuation of a strife was likely to be. The era is still used by the Copts of Egypt and the Abyssinians. The change from the Egyptian to the Julian calendar, and the peculiar complications it has introduced into the conversion from that era to ours, are too intricate to detail here. To make the change, add to their date 283 years 240 days in common years; if the date is between 30 August and the end of the year in the one before leap year, add 283 years 241 days. But the Ethiopians do not reckon the years continuously from the beginning: at the end of each 532 years (that is, 28×19, or the solar and lunar cycles multiplied together) they begin again with 1.

The Christian Era.— It is not generally realized how modern this epoch is in general use. It was introduced into Italy 533 A.D. by Dionysius Exiguus ("the lean"), a Roman abbot; was not introduced into Gaul (France) till the 8th, and not in current use there till the 9th; and came into use in England only in the latter part of the 8th. In Latin countries the current scheme before that was the cycle of indiction (below). Any uniform date is so useful that

its defects may be overlooked. That of having a double set of numbers, forward and back, is not serious. Perhaps the chief inconvenience in calculating backward is that of calling the year preceding the era 1 B.C. instead of 0; thereby making the leap years on the backward series fall on the odd years, 1, 5, etc., or else making 7 years between the first one previous and the first one after. Astronomers rectify this by calling the first year previous 0. For the different dates on which the beginning of the year has been placed, see CALENDAR. Dionysius fixed the birth of Christ in 754 of the Roman Era, but he began the year 1 with the Annunciation, 25 March of the year preceding. In ecclesiastical and common usage it has begun at Christmas, Easter, 1 March, and other dates. In England from the 7th to the 13th century it was on Christmas; in the 12th the Annunciation began to be used as well, and from the 13th till 1752 remained paramount. The different beginnings of the year must be carefully taken into account in studying mediæval history.

Cycle of Indiction.— This was a period of 15 years, whose object has been already explained. It was generally used in the Western or Latin empire for several centuries before the Christian Era became general. It began in the year 313, or was referred to that year as a start. There were three, differing only as to the beginning of the year: (1) The Constantinopolitan, beginning in September, like the Greek year; generally used in the Eastern or Greek empire, and sometimes in France. (2) The Imperial or Constantinian, attributed to Constantine the Great, called also the Cæsarean. It began 24 September, and was used by old French and English chroniclers. (3) The Roman or Pontifical, beginning on Christmas or 1 January as custom varied; often used in papal bulls, and sometimes in old French writers. To find the number of any year in the Indiction, add 3 to the date (our era), divide by 15, and the remainder is the number. If the remainder is 0, the year is the fifteenth or last of the cycle.

Armenian Era.— This starts from the Council of Tiben, 9 July 552, when the Armenian schism began by condemnation of the acts of the Council of Chalcedon. The Armenian civil year is the Egyptian year of 365 days. out of all measure with others; their ecclesiastical year begins 11 August, and has the Julian calendar. They also use the Creation Era of Constantinople along with their own, dating documents with both on occasion. In business with Europeans they employ our era and our year. To convert their civil dates to our era, multiply the number of Armenian years by 365; add the number of days from 1 January to the given date; subtract 176; the remainder will be the number of days from 1 Jan. 553 to the given date; reduce this to Julian years, add 552, and this gives the date in the Julian year, old style. Add the requisite number in the Gregorian calendar if desired. In ecclesiastical reckonings, add 551 years 223 days. In leap years, if the date is between 1 March and 10 August, subtract one day from the above.

Mohammedan Era.— This commemorates the Hijra or Hegira (flight) of the Prophet from Mecca to Medina, 622 A.D. It does not, however, date from the flight, but from 68 days previous, 16 July, or as some have it, 15 July. The methods of computation are too complicated and uncertain to be given here: Mohammedan chronology is one of the most treacherous of subjects, and even experts disagree and go astray.

Persian or Gelalæan Era.— This begins with the accession of Yezdegird III. to the throne of Persia, 16 June 632. Till 1079 the Persian had the random Egyptian year, 365 days without intercalation; it was then reformed by Omar Khayyam, the great poet and astronomer, under Malek Shah, to a degree almost as accurate as the Gregorian. There were seven successive leap years once in four years, but the eighth was deferred till the fifth year. This method was once universal in Persia, and is still followed by the Parsees of India. Owing to the days of error accumulated by the old year, the day of beginning is thrown back, so that the Persian year can be converted into ours by adding 631.

Hindu Eras.— The philosophers divided the duration of the world into four *yugs* or ages, of which three are past, and the present corrupt one, the *kali-yug*, is alone historical. It begins 3101 B.C. and includes several others in use. The Era of Vikramaditya, from a Hindu Augustus who may or may not be historical, is reckoned from 57 B.C. This monarch is generally attributed to the 5th or 6th century if real, and the epoch is thought a sidereal one. The Era of Salivahana is 78 A.D. This is used in southern India, and commemorates an equally dubious ruler. The Fusli Era, used in revenue transactions all over India, is not uniform, but the most usual begins 590 A.D.; it seems to be a Mohammedan one, and to correspond roughly to the Hegira. The Bengali Era is another of the sort, and is set at 631. There are also others which are used in different provinces. The 60-year cycle is employed, its date being variously set.

Chinese Chronology.— This rests on cycles of 60 years, the mathematical tribunal fixing their start at 2277 B.C. But since 163 B.C. the Chinese writers have used periods called Nien-hao, each beginning with the accession of some emperor, and named after him, as with English laws, and ending when he or some successor chooses to begin a new period. Tables of Nien-hao are therefore needed to identify the years.

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Chronom'eter (Gr. Χρόνος, "time"+*μέτρον*, "measure" = "time-measurer"), an instrument designed to measure time with great accuracy, and much used in scientific work and for the determination of longitude at sea. The marine chronometer bears a strong superficial resemblance to a watch, except that it is larger and is mounted upon gimbals, so that the motion of the ship may affect it as little as possible. In its mechanism it differs from a watch chiefly in the design of its escapement and balance-wheel. The usual form of escapement, as invented by Le Roy about 1765 and greatly improved by Earnshaw and Arnold some 15 years later, is shown in Fig. 1.

In the ordinary watch the balance-wheel is in connection with the train of wheels leading from the mainspring continuously, or nearly so; but in the chronometer it is free from these during the greater part of the time, so that its natural period of vibration is more nearly realized. A is the escape-wheel, which is in gear with the other wheels of the instrument and is prevented from free rotation by means of the locking-pallet, D. B is a disk (technically

known as the "impulse-roller") secured to the same staff, or axis, as the balance-wheel. F is the "detent spring," which serves to return the light frame, G, and the locking-pallet, D, to the position they have in the illustration, after the detent has been tripped by the balance-wheel. A set screw is provided for preventing the locking-pallet, D, from being drawn too far into the escape-wheel, but this has been omitted in the illustration for the sake of greater clearness.

When the mechanism is in the state shown, the balance-spring should be free from strain; but the balance-wheel is moving with its maximum velocity in the direction (let it be supposed) of the arrow, so that in another instant the discharging-pallet, H, will trip the detent by momentarily withdrawing the locking-pallet, D. The escape-wheel, A, is then free to rotate until again arrested by the locking-pallet, D; but as it does so it engages the impulse-pallet, C, and accelerates the balance-wheel. After the escape-wheel has been arrested by the locking-pallet, the balance-wheel continues its excursion until the energy of its motion has all been expended in winding up the balance-spring. The balance-spring then preponderates, and the wheel returns to the opposite extreme of its swing without disturbing the locking-pallet, D; the discharging-pallet, H, merely raising the light gold spring, E, as it passes the detent. In most chronometers the balance-spring is made in the form of a helix instead of a flat spiral.

The balance-wheel is also compensated for change of temperature, though this feature can hardly be said to constitute a point of difference between a chronometer and a watch, since practically all of the better grades of watches are now similarly compensated. The effect of an increase of temperature upon the rate of a chronometer (or watch) is of a dual nature. If the instrument keeps correct time at one temperature, then, unless some mode of compensation is provided, it will lose time at all higher

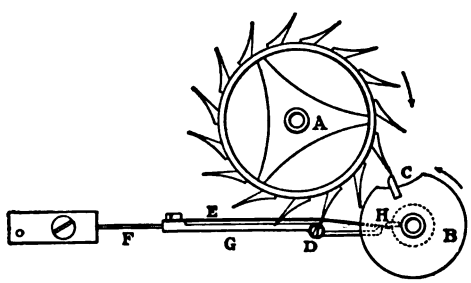

FIG. 1.—Chronometer Escapement.

temperatures, because (1) the strength of the balance-spring is less at higher temperatures, and (2) the wheel itself is greater in diameter on account of its natural expansion, so that it has a greater moment of inertia, and hence responds more sluggishly to the action of the balance-spring. To counteract these effects as far as possible, certain weights are provided along the rim of the wheel and the wheel is so designed that as the temperature rises these weights are automatically thrown nearer to the axis of rotation. The moment of inertia of the wheel is thereby reduced, and the wheel is caused to respond to the weakened spring with precisely the same readiness as before. The essential parts of the balance-wheel of a marine chronometer are shown in Fig. 2. The rim is

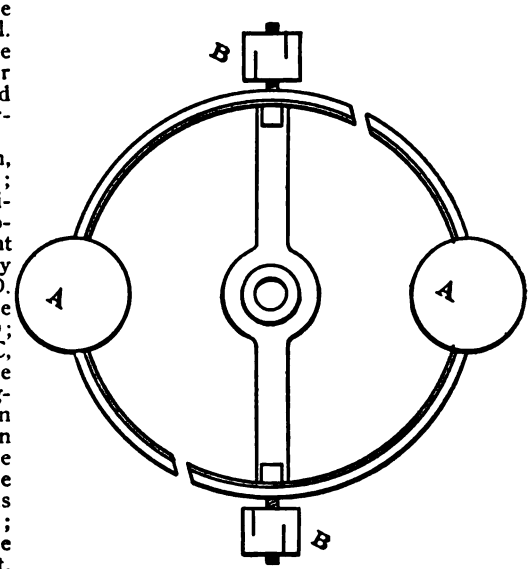

FIG. 2.—Balance Wheel of Marine Chronometer.

divided by transverse cuts into two equal, semicircular segments, each of which is supported near one end; and it is built up of two concentric metal strips, of which the inner is steel, while the outer (which is twice as thick) is of brass. As the temperature rises the brass expands more than the steel, so that the rim-segments are deflected inward, and the weights, AA, are caused to approach the axis (or "staff") of the wheel. The two masses AA must always be opposite one another, in order that the balance may not be thrown out of poise; but they are slotted so that they may be slid along the rim. If a chronometer keeps correct time at one temperature, but loses at a higher temperature, the compensation is not sufficient, and the masses AA must be shifted toward the free ends of the rim-segments. If it gains at the higher temperature it is over-compensated, and the masses AA must be shifted toward the fixed ends of the rim-segments. In practice it is found to be impossible to adjust the masses so that the instrument shall be perfectly compensated at all temperatures. In fact, the theory of the balance shows that there are only two temperatures at which the chronometer can be expected to keep correct time, though these two may be selected arbitrarily, and the instrument adjusted accordingly. In marine chronometers the temperatures so selected are usually 45° and 90° F., and at intermediate temperatures the instruments will gain. Hartnup, the director of the Liverpool Observatory, concluded, as the result of experiments upon 1,000 chronometers, that the error in rate from imperfect compensation may amount to 1.5 seconds per 24 hours at temperatures 15° F. above or below either of the points at which the balance is standardized, when the balance-spring is of steel. With palladium springs the error is smaller. When the

balance has been compensated for temperature as accurately as possible, the moment of inertia of the wheel is adjusted so that the chronometer will keep correct time at the standard temperatures, by means of the slotted nuts BB. These turn upon screw-threads that are secured to the rim near the central arm, where their positions will not be sensibly affected by changes of temperature. If they are caused to approach the rim, the moment of inertia of the wheel is lessened, and the chronometer runs faster; and *vice-versa*. The slots in BB are provided so that the nuts may grasp their screws spring-tight, and so avoid backlash. (For full information on these matters and many others connected with time-pieces, consult F. J. Britten's 'Watch and Clockmakers' Handbook.')

Chronoscope, krŏn'ō-skōp, an ingenious instrument, due to Sir Charles Wheatstone, for the purpose of estimating the duration of certain luminous phenomena, such as the electric spark, which according to ordinary means of measurement, appear absolutely instantaneous. It is founded on what is known as persistence of the impression on the retina of the eye. When a burning stick is whirled rapidly through the air a line of light is seen, the impression that the eye receives from the bright point in one position remaining long after the point has moved to a new position. Wheatstone views the electric spark in a small steel mirror revolving with enormous, but measured, velocity, and having a motion arranged, so that, were the light permanent, the object would appear to describe a complete circle. If then the phenomenon be instantaneous, a mere point of the circle will be seen, but if it have a duration shorter than the time of a revolution of the mirror, but still not infinitely short, the image will stretch out into an arc of the circle proportionate in length to the duration. The principle has been employed to show the discontinuity of certain flames which from persistence of vision appear continuous. These, when viewed in a mirror revolving rapidly, appear as a number of points or streaks of light arranged at intervals along the circle.

Chrosperma, krō-spĕr'mą, a monotypic genus of plants of the natural order *Melanthaceæ;* the bunch-flower. The single species (*Muscætoxicum*) is commonly known as fly-poison, so called from its deadly effect on flies and similar insects. It abounds in dry sheltered soil from Arkansas and Tennessee eastward along the seaboard of the United States, in some sections reaching high altitudes.

Chrudim, Hroo'dēm, Austro-Hungary, a town and capital of a circle of the same name of Bohemia, situated 62 miles southeast of Prague on the river Chrudinka. It is a walled town and contains an old church and a Capuchin convent. It has manufactures of cloth; and the horse markets held here are the most important in the empire. Pop. 13,000.

Chrysal (krĭs ąl) **or the Adventures of a Guinea,** a satirical novel by Charles Johnstone, published in 1760. Chrysal, the spirit inhabiting a guinea, passes through many hands, from the prince's to the beggar's, and tells its own story, which is chiefly the adventures of those in whose possession it is for the time being.

Chrysalis, krĭs'ą-lĭs, the pupa stage in butterflies, succeeding the caterpillar. During this time the insect eats no food, living upon the fat stored up by the larva. (See PUPA.) The chrysalids of butterflies differ from the pupæ of moths in being often ornamented with brilliant golden spots which have given origin to the name "chrysalis" or "aurelia." Also the body is often strengthened or protected by tubercles situated on the head, back, and sides. They are either suspended head downward by the tail, or rest horizontally, with a thread passing around them to hold them securely. Many, if not most, chrysalids are protected from observation by their colors, which harmonize with the color of the object to which they are attached. Thus, the chrysalis of the milkweed butterfly (*Anosia archippus*) which is suspended among the pale-green leaves of the milkweed and does not hibernate, is of a pale-green tint; while those of *Papilio turnus,* or of *Pieris,* are gray, and so spotted with light and dark marks as to harmonize with the neutral tints of the boards or fence to which they are attached. These colors and markings are apparently due to the effects of light and shade. These tints are determined at the period when the caterpillar is about to pupate, or become a chrysalis, when the integument is soft and moist. Poulton found, by subjecting the partly formed chrysalis to artificial surroundings of different colors, that the breeding boxes, when lined with black paper, produced dark chrysalids; when lined with white, light-colored, or green ones, or when lined with gilt, they produced chrysalids of a distinctly golden color, more completely so than occurs in nature.

Certain chrysalids have been found to exhibit negative phototropism (q.v.); that is, are directly sensitive to light. They will, while suspended by the tail, change their position if sunlight strikes them, and move so as to keep in the shade, from a pendant to a horizontal position, through an angle varying in different species of from 45° to 70° or even 90°. Too much light, especially direct sunlight, seems to be injurious to them, and the movement is one of protection.

Chrysanthemum, krĭ-săn'thę-mŭm, a genus of herbs and sub-shrubs of the natural order *Compositæ.* The very numerous species are natives mostly of the cooler parts of the northern hemisphere, but some have become introduced and established in the southern hemisphere as weeds, having escaped from gardens. They are generally hardy, white or yellow-flowered, annual or perennial, and of easy cultivation. Except *C. cinerariæfolium* and *C. coccineum,* the flowers of which are used to make insect powder (q.v.), the species have small economic use, though some, notably *C. leucanthemum,* the ox-eye daisy, is a troublesome weed upon badly managed land in the United States. *C. segetum,* the corn-marigold, and *C. frutescens,* the marguerite, are cultivated for ornament, especially in Europe, where they are native.

But the most important species are *C. indicum* and *C. morifolium* (*C. sinense* of some botanists). These are the parents of the popular autumn flowers known as "mums" and chrysanthemums, the varieties of which in Europe and America are numbered by thousands, and vary greatly in size, form, and color. So great is the

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diversity that fanciers speak of the varieties as belonging to certain types, of which 11 are recognized: Single, double, large, small, few-flowered, many-flowered, anemone-flowered, and various forms of the ray flowers, such as incurved, reflexed, etc. The size ranges from the "pompon," which may be less than an inch in diameter, to the "show," which may exceed eight inches in diameter. But with all this range of form and color the varieties are almost scentless, or have a somewhat disagreeable odor. These varieties are mainly cultivated under glass, since they do not reach perfection in the open air. They are propagated almost wholly from cuttings, which are taken from the parent plant after it has flowered. The cuttings are grown in a cool greenhouse until spring, when the young plants, then in pots, are placed in partial shade for the summer and kept as stocky as possible. In autumn they are forwarded until they blossom, after which they are destroyed, new cuttings having been taken.

For exhibition purposes the plants are watched and tended with the most minute attention, the superfluous buds and stems being removed while still tiny. Sandy or clayey soil is found useful by various growers, but whatever its character it must be rich and rather porous. Attention to fertilization, watering and cultivation are essential. For out-door culture the large-flowered varieties are unsuited, but the hardy pompons, which are usually free-flowering, are more satisfactory. Though the season of the indoor chrysanthemum is only about six weeks long, this flower ranks fourth in importance in the United States as a commercial flower, about $500,000 worth being used annually.

The literature dealing with this flower is voluminous, probably ranking next in extent to that dealing with the rose. Eighty-three books are listed by C. Harman Payne in the 'Catalogue' of the National Chrysanthemum Society (1896). Other references to literature are given under the title Chrysanthemum in Bailey's 'Cyclopedia of American Horticulture,' which should be consulted for descriptions of various species, types, etc., and for methods of propagation, cultivation, and management. Consult also: Scott, 'The Show Chrysanthemum and Its Cultivation'; and Bulletins 112, 136, and 147 (1896–8), of the Cornell University Agricultural Experiment Station.

Chrysarobin, krĭ-să'rō-bĭn, a neutral principle extracted from goa-powder, a substance found deposited in the heart wood of *Vouacapoua araroba.* It is an extremely irritating substance and is not used internally. Externally, combined with an ointment base, it is useful in a number of chronic skin affections.

Chryseïs, the daughter of Chryses, a priest of Apollo. She was captured by the Greeks in the Trojan war, and became the portion of Agamemnon. When he refused to restore the daughter at the request of her father, Apollo listened to the prayer of his priest, and sent by his arrows pestilence and death into the Greek camp. Agamemnon found himself obliged to yield up the maiden, but then robbed Achilles of the fair Briseïs. Hence arose the dissension between these heroes which so long delayed the conquest of Troy, and with which the story of the Iliad opens.

Chryselephantine, krĭs"ĕl-e-făn'tĭn, in Greek art, statues which were overlaid with ivory and gold. The frame or body of the statue upon which the ivory plates were fastened was usually of wood, and the gold was used for the garments and hair. The most celebrated of these statues were the colossal works of Phidias, of which the largest was the Pallas of the Parthenon, 26 cubits high, representing the goddess in armor covered with a long robe.

Chryses, a name appearing several times in Grecian legend: (1) a priest of Apollo, who, according to Homer, came to the Grecian camp to ransom his daughter Chryseïs, who had become the prize of Agamemnon. (2) The son of Neptune and Chrysogeneia, and the father of Minyas. (3) Was the son of Minos and the nymph Pareia. He lived on the island of Paros with his brothers Eurymedon, Naphaleon, and Philolaus, and was put to death by Hercules because he had, in concert with them, murdered two of his companions. (4) A son borne by Chryseïs to Agamemnon after her return to her father, but alleged by her to be the son of Apollo. He assisted his step-brother and step-sister, Orestes and Iphigenia, in murdering King Thoas.

Chrysippus, Greek Stoic philosopher of Cilicia: d. about 206 B.C. He was distinguished for his skill in disputing. He was the principal opponent of the Epicureans, and is said to have written 700 different works, mostly of a dialectical character; but of these no complete work is extant. He died at a great age.

Chrysis, a priestess of Juno, who by falling asleep suffered the sacred fire to destroy the temple of her goddess, and was at last burned herself.

Chrysobalanæ, krĭs-ō-băl'a-nae, a plant family closely allied to the *Rosaceæ,* of which it is sometimes considered a sub-order, comprising 12 genera, with 180 species, all trees or shrubs. Many of them, as the cocoa-plum, produce edible fruits. So do several species of west Africa, the seeds of which are sometimes substituted for or used to adulterate sweet almonds, which they resemble in taste and appearance. From the seeds of a member of the family growing in the Himalayas an oil is extracted.

Chrysoberyl, krĭs-ō-bĕr'ĭl (Gr. Χρυσοβήρυλλος, "golden beryl"), a native aluminate of glucinum (or beryllium), having the formula $GlO.Al_2O_3$, and crystallizing in the orthorhombic system. It is transparent or translucent, with a vitreous lustre and a green or yellow color. The variety alexandrite (q.v.) is green by daylight and columbine-red by artificial light. The finer varieties are used as gems. It has a hardness of 8.5 and a specific gravity of from 3.5 to 3.84. Chrysoberyl occurs in Brazil, in Ceylon, in the Urals, and in Ireland; and in the United States it has been found in Maine, Connecticut, and New York. See also CAT'S-EYE.

Chrysocolla, krĭs-ō-kŏl'la, a hydrated silicate of copper, having the formula $CuSiO_3 + 2H_2O$. It is cryptocrystalline and usually occurs in opal-like or earthy masses, or as incrustations, or not infrequently with botryoidal surface. When pure it is translucent and of sky-blue color, but when impure it is often opaque and dull green, brown or black. Its hardness varies

with its composition, from 2 to 4, and its specific gravity from 2 to 2.2. Its lustre varies from vitreous and shining in the pure mineral to dull and earthy. It is found in copper mines in all parts of the world, especially in Cornwall, England, Australia, and Arizona. The chrysocolla of the ancients, meaning "gold glue," was apparently a body used to facilitate soldering. The name is still applied to borax which is thus used. Malachite, the green carbonate of copper, was doubtless confused with chrysocolla.

Chrysogonum, krĭs-ō-gō'nŭm, a monotypic genus of the natural order *Compositæ*. It is found throughout the eastern seaboard of the United States, in dry soil, from southern Pennsylvania to Florida, blossoming in April and July. It is a perennial herb with large heads of tubular and radiate flowers.

Chrysolite, krĭs'ō-līt (Gr. *κρυσόλιφος* "bright yellow stone"), a native silicate magnesium and iron, sometimes also containing titanium, nickel, or tin. It occurs massive and granular, and also in orthorhombic crystals. It is transparent or translucent, and usually green or yellow in color, with a vitreous lustre. It has a specific gravity of from 3.27 to 3.57 (according to its composition), and a hardness of from 6.5 to 7. Chrysolite occurs in volcanic rocks, as in basalt and basaltic lavas, and it is also found in dolomite and in certain varieties of limestone. The finest crystals of the mineral come from Brazil and Egypt, and are known as "precious chrysolite." They are used to a certain extent as gems, and are sometimes confused with the emerald. Chrysolite readily passes by alteration into serpentine, and numerous large beds of the latter mineral are known to have originated in this manner. It is abundant in crystalline grains in some meteoric irons and stones. Peridot and olivine (qq.v.) are names frequently used for varieties of chrysolite.

Chrysoloras, Manuel, Greek scholar: b. about 1355; d. Constance, Germany, 15 April 1415. He was the first who, in modern times, transplanted Greek literature into Italy. The Emperor John Palæologus sent him in 1391 to Italy and England to ask for assistance against the Turks. Having thus become known in Italy he returned there about the year 1395, and was appointed professor of Greek literature at Florence, where he collected around him a great number of scholars of all ages and ranks, and excited universal enthusiasm as much by his dignity and the grace of his elocution as by the extent of his learning. From his school proceeded Leonardo Bruno, Poggius, Francis Philelphus, and other distinguished revivers of classical studies. He afterward taught with equal success at Milan, also at Pavia and Venice, and lastly at Rome. Pope Gregory XII. employed him in public affairs, and sent him with others to the Council of Constance, where he died in 1415. He should not be confounded with his nephew and companion in Italy, John Chrysoloras.

Chrysomelidæ, krĭs-ō-mĕl'ĭ-dē, an extensive family of small beetles which have a hemispherical or ovate form, small, sunken head, and antennæ widely separated. All, and especially the typical genus *Chrysomela*, are very gaily colored,—blue, green, golden, or a mixture of brilliant tints. The most elegant American species (*C. scalaris*) has the head, thorax, and under side dark green, while the wing-covers are silvery white, ornamented with small green spots on the sides and a broad irregular stripe down the middle of the back; the legs and antennæ are rust-red, and the wings rose-colored. These beetles inhabit trees, bushes, and plants, feeding, in their larval state, on the leaves. They include many species, as the potato-bug and the elm-leaf beetle, which do vast damage. Their eggs are laid on the leaves, and the grubs, which as a rule are protected by disagreeable odors and exudations, go into the ground to transform, and there spend their pupal life. The family is a very large one and is spread all over the world. See LEAF-BEETLES.

Chrysophanic (krĭs-ō-făn'ĭk) **Acid,** the yellow coloring matter of rhubarb. It can be obtained direct from rhubarb by exhausting with benzol and purifying the crude product. It crystallizes in fine yellow tables. It is hardly soluble in water, but dissolves in ether, benzol, etc. With potash it gives a fine purple solution, and thus affords a delicate test for the presence of alkalis. It is also soluble, without decomposition, in strong sulphuric acid. Its acid properties are rather obscure.

Chrysophyllum, krĭs-ō-fil'ŭm, a genus of the sapadillo family (*Sapotaceæ*), consisting of trees with milky juice, alternate leaves with numerous transverse closely aggregated ribs, and golden hairs on the under surface. In the West Indies the fruit (*cainito*) is esteemed a delicacy under the name of star-apple, which is fleshy, with several one-sided cells, or by abortion, with one. Seeds nut-like. Natives chiefly of southern United States, Africa, and India.

Chrysoprase, krĭs'ō-prāz, a variety of chalcedony, colored apple-green by nickel oxide and prized as a semi-precious stone. It became popular a few years ago because of Queen Victoria's fondness for it. Silesia and Siberia long furnished a small supply, but recent discoveries in California have made it abundant and cheap. It also occurs in Oregon and North Carolina.

Chrysopsis, krĭ-sŏp'sĭs (from the Greek, signifying "of a golden aspect"), a genus of about 20 species of the natural order *Compositæ*, comprising nearly 30 species, natives of North America and Mexico. Commonly known as the golden aster.

Chrysostom, Dion (surnamed COCCEIANUS), Greek orator: b. Prusa in Bithynia about 99 A.D. He was first a Sophist, then a Stoic, and rose into high repute as an orator under Domitian. That tyrant, however, took offense at his freedom of speech, and he was obliged to save himself by flight. He was afterward highly esteemed by Nerva and Trajan. About 80 of his orations are still extant. They are written in an affected style, but notwithstanding form a valuable contribution to our knowledge of ancient philosophy. They appeared first in a collected form at Milan in 1476.

Chrysostom, John, Saint, archbishop of Constantinople, greatest of the Greek Fathers of the Church: b. Antioch, the capital of Syria, about 347. His cognomen, the golden-mouthed (*chrysostomos*), he owes to his extraordinarily rich, fervid, and persuasive eloquence. In his youth

he attended the school of Libanius, a celebrated Pagan sophist, was his favorite disciple, and would have been his successor had he not been won for the service of the Church by his pious mother Anthusa. In accordance with the general usage of that time, he did not receive baptism till he had attained maturity, and then he lived devoted in religious contemplation and studious seclusion in a desert place for six years. There the austerities he practised undermined his strength, and being called back to Antioch by the bishop, he was ordained deacon in 381 and presbyter in 386. By his zeal, his urbanity, and his eloquence, he won to the Church, heretics, pagans, and Jews in great numbers; and his fame spreading to the capital city of the Eastern empire, he was, with the approval of the Emperor Arcadius chosen to be archbishop of Constantinople in 397. Here he led in the episcopal palace the life of an ascetic, eschewing the pomp and luxury of his predecessors, and out of the revenues of the see maintained numerous charities. Meanwhile his homilies or pulpit discourses, which are still extant, were even a stronger attraction for the masses than the shows of the amphitheatre. But he had many rivals, who left no means untried to blacken his character, his reputation for piety, zeal, disinterestedness, and for orthodoxy, and his life was accordingly full of trials and vicissitudes. His enforcement of the Church's laws regarding the relations between ecclesiastics and the female inmates of their households; his deposition of bishops for simony and licentiousness; the restraints he put upon the vagrant habits of the monks, called forth a host of enemies, who brought against him the charge of sympathizing with heretical monks of the Nubian desert who had been excommunicated by their ecclesiastical superior, Theophilus, patriarch of Alexandria. Theophilus now added himself to the malcontents of Constantinople, and he called a synod of bishops to be held in the imperial city to judge Chrysostom. But because of the menacing attitude of the common people, who were to a man loyal to their archbishop, the synod had to be held in the neighboring city of Chalcedon. To this synod Chrysostom was four times summoned, to reply to the charges that were to be made against him, but he ignored the summons, and was declared guilty of favoring the heresies of Origen. By order of the emperor Arcadius he was exiled to Nicæa in Bithynia; but so great was the commotion of the common people in Constantinople when the decree of banishment was published, that the emperor, alarmed, ordered his recall. The re-entry of Chrysostom to the city was attended with all the pomp of a Roman triumphal procession, and he abated no jot of his zeal for the repression of the evils of Church and state. His language was, as it had ever been, sufficiently emphatic, sufficiently plain-spoken, but his enemies put in circulation a spurious version of the opening passage of his first discourse after his return: he was reported by them to have commenced his address with these words in denunciation of the empress Eudoxia: "Herodias is again furious; Herodias again dances; she once more demands the head of John." The report was false, but the fate of Chrysostom was sealed. Barbarian troops were brought into the city to overawe the commons while another synod was in session in the city: it confirmed the decree of the synod of Chalcedon. By decree of the emperor, Chrysostom was banished to Cucusus, a place in Mt. Taurus. The people of Constantinople, not to be restrained by the garrison of Gothic mercenaries in the city, set fire to the cathedral and the senate house on the day the decree was published; and Chrysostom, though absent, was a more formidable power than ever: his correspondence with bishops, both in the East and West arrayed the whole Catholic Church against Theophilus and the court of Arcadius. Indignant at the contumacy of the exiled archbishop, Arcadius ordered his transfer to a more inhospitable region still, the desert of Pityos: he died on the way thither at Comana, in Pontus, 14 Sept. 407, being then in his 60th year. His day in the calendar of the Greek Church is 13 November; in that of the Latin Church, 27 January. His last words are reported to have been "God be in all things praised." His works that are still extant are very voluminous, and they fully justify the high repute he enjoyed, both as an orator and an expounder of the Scripture books and of points of doctrine. They consist of homilies or discourses suggested by or illustrating passages of Scripture; commentaries on the sacred books; epistles, and treatises on the truths of religion, virtues and vices, etc.

Chrysotile, krīs'-ō-tīl, a variety of the mineral serpentine, occurring in silky fibres that are flexible and easily separated. It is commonly greenish in color. Its specific gravity is about 2.22, which is sensibly less than that of ordinary serpentine. It occurs abundantly in Canada, where it is known as "bostonite" and "asbestos." See ASBESTOS.

Chrystler's Farm, Battle of, the most discreditable American defeat, as Chippewa was the most brilliant victory, of the War of 1812, was fought 11 Nov. 1813. The expedition prepared in the summer and fall of 1813 at Sackett's Harbor, on Lake Ontario, to descend the St. Lawrence and capture Montreal, started 17 October under bad auspices. Aside from insufficient resources and the lateness of the season, the personnel was hopeless. The commander-in-chief alone would have ruined it. This was Maj.-Gen. James Wilkinson, termed by Scott, "an unprincipled imbecile," a mere cunning jobber, of neither military talent, firmness, nor even character to be respected, and despised by all the other officers. He had been appointed for the curious reason that New Orleans was not thought safe in his hands. Furthermore, he was prostrated with lake fever, as was his second in command, Morgan Lewis. Boyd, the third, was so incompetent that Jacob Brown, the one able fighting general, had threatened to leave the army rather than serve under him. Men cannot fight without leaders. The flotilla, battered by contrary winds, began the descent of the river 5 November. From this on, the British made progress slow and dangerous. Capt. Mulcaster, an able and daring naval officer, with several gunboats, harassed the rear, and 800 regular infantry co-operated with him, pouring musketry and artillery fire on the expedition from the opposite bank whenever possible, besides the batteries at Prescott. Brown's and

Macomb's brigades were landed on that side to clear the road; and by 10 November the flotilla had reached the Long Saut, and anchored for the night at Chrystler's Farm on the Canadian side. The next morning Brown marched down beside the rapids with his brigade, and Boyd was ordered to take the rest of the troops, some 2,000, with six field pieces, and guard the rear. Brown reported all clear, and the fleet was about to run the rapids when Boyd reported that the enemy was advancing in order of battle. Wilkinson was sick in bed and could give no orders; so was Lewis; and Boyd was left to fight his own battle. He did it as a weak commander usually does, by detachments, which the British crushed in detail, though they had but 800 against 2,000. The battle lasted from about 2.30 to 4.30, when Gen. Covington was killed and his brigade driven back in disorder. Then the whole American line gave way and retreated in haste. Wilkinson reported 102 killed and 237 wounded, and the British claim to 100 American prisoners is more likely to be true than Wilkinson's report of none. The British reported 22 killed, 148 wounded, and 12 missing. The American troops hurriedly re-embarked; the next morning the flotilla ran the rapids to Cornwall. There Wilkinson learned that his colleague, Wade Hampton, had ended operations for the season (see CHATEAUGAY), and at once went into winter quarters. Consult Henry Adams, 'History of the United States,' Vol. VII., chap. 8.

Chu-Hi, choo-hē', Chinese scholar and philosopher: b. 1130; d. 1200. As a student of the Chinese classics, he became widely known through his interpretation of the doctrines of Confucius, and became one of the founders of the Chinese school of speculative philosophy. He had a large number of disciples among the scholars, and they, under his direction, compiled a history of China in 59 books, which is still a standard work.

Chu-Kiang, choo-ke-äng', or **Canton, River,** the "Pearl River" of the Chinese, is the lower part of the Pe-Kiang, and has a navigable channel of about 300 miles. Opposite Canton it is about one fourth mile wide, and is crowded with shipping up to 1,000 tons burden; larger vessels must tie up at a point 15 miles below. About 40 miles below Canton it is called "Boca Tigris," or "The Bogue."

Chub, a name given to various species of fishes of the family *Cyprinidæ* (q.v.), of which the river chub (*Hybopsis kentuckiensis*) and the creek chub (*Semotilus atromaculatus*) are the most important in the United States. The name is also sometimes applied to the roach (q.v.), and more rarely to certain marine fishes, as the rudder-fish. The river chub is abundant in rivers and creeks throughout the eastern United States, and may be known by its orange-colored fins and the tuberculate head of the males in spring. It reaches a length of 10 to 12 inches, and is a favorite with the less ambitious anglers in certain regions. The creek chub, or horned dace, is even more widely distributed, and inhabits brooks rather than rivers. It resembles the roach, but has a black spot in front of the dorsal fin and does not exceed a foot in length. The large black chub (*Acrocheilus alutaceus*), of the Pacific coast rivers, is known locally as chiselmouth, squaremouth, and hardmouth. The English chub (*Squalius cephalus*) is a much larger fish, attaining a length of two feet and a weight of eight pounds, and lives in mountain brooks as well as in rivers. It is a game fish of considerable importance.

Chub-mackerel, a fish (*Scomber colias*), found in immense numbers in the Mediterranean Sea. It is the "Spanish mackerel" of England.

Chubb, Thomas, English controversialist: b. East Harnham, near Salisbury, 29 Sept. 1679; d. Salisbury 7 Feb. 1747. He was a mechanic who employed his leisure in the acquisition of knowledge from the best English books which he could procure. In 1715 he published 'The Supremacy of the Father Asserted,' the perspicuity and argumentative skill of which obtained for it much notice. Of course a production assailing the orthodox faith did not pass without reply, and a controversial warfare commenced which lasted as long as his life. In 1730 he offered to the world his thoughts on a variety of topics, moral and theological, in thirty-four tracts, collected in a 4to volume, of which book Pope in a letter to Gay speaks with great respect. Various publications followed, for example, 'A Discourse Concerning Reason'; 'The True Gospel of Jesus Christ Asserted'; 'Inquiry into the Ground and Foundation of Religion,' etc.

Chubb Lock (so called from the name of the inventor), one of the most intricate of the many-tumbler locks which were first made in England by Barron in 1774. The locks of Chubb have obtained their celebrity partly from their superior workmanship, having more tumblers than usual, with the addition of a lever called the "detector," which is so fixed that, while it does not act under the ordinary application of the key, it cannot fail to move if any one of the tumblers be lifted a little too high, as must be the case in any attempt at picking. The bolt becomes immovably fixed, and thus, while rendering all further attempts at picking useless, gives notice that such an attempt has been made on the next application of the proper key. To draw the bolt after it has been tampered with, it is necessary only to turn the key a little farther forward, as in the process of overlocking; this pushes up a tooth at the end of the detector, restoring the lock to its original position, and the key is then free to turn in the ordinary way. These locks, which were patented as far back as 1818, maintained the reputation of being invincible until the celebrated locksmith Hobbs, of the United States, in 1851 succeeded in picking the most intricate locks of English workmanship, such as Chubbs, Bramahs, and Cotterills.

Chubut, choo-boot', Argentina, a territory in the northern part of Patagonia, so named from a river which drains a large part of the surface. Its area is about 90,000 square miles. Its principal interest lies in its Welsh settlement, which has remained almost wholly Welsh-speaking. The first settlers, 151, arrived in July 1865. Epochs in its history have been the abandonment of the colony in 1867; the subsequent return from New Bay; a 20 months' nearly complete isolation from the outer world, terminated in 1871. The principal town, Rawson, is situated about five miles from the Atlantic Ocean, and has a population of a few hundreds. English grain and roots are produced, and salt of good quality is found.

Chuck'-Will's-Wid'ow, a large, nocturnal bird (*Antrostomus carolinensis*) related to the whippoorwill, common in the Southern States of the Union. The name is an attempt to reproduce the note of the bird. It is fully 12 inches in length, and is one of the largest of American song-birds, and when uttering its call, opens its mouth enormously. The eggs are laid upon the ground, little or no attempt being made to form a nest. The bird is a voracious eater of insects, its large bristled mouth fitting it for catching flying objects.

Chuckwal'la. See LIZARD.

Chufa, choo'fa. See NUT-GRASS.

Chu'kor, or Chicore, a partridge (*Caccabis chukor*), the favorite game-bird of the foothills of the Himalayas.

Chumbul', a large river of Hindustan. It rises in Malwa, in the Vindhya Mountains, about 50 miles south of Oojein, flows north, enters Rajpootana, through which it runs northeast, and falls into the Jumna about 90 miles southeast of Agra, after a course of over 650 miles.

Chunam', in India, a name given to a very fine kind of quicklime made from calcined shells or from very pure limestone, and used for chewing with betel (q.v.). It is also used for plaster, being mixed with fine sand by wetting, and sometimes with various other materials added. It makes a plaster of great durability, capable of being highly polished, and suitable for decorative work.

Chunar-Ghur, chŭn-är'gėr, India, a town, fortress, and invalid station in Hindustan, 17 miles southwest of Benares, on the Ganges. The fortress stands on a lofty rock rising abruptly from the river. Chunar was stormed by the British in 1764, and formally ceded to the East India Company in 1768. Pop. 12,000.

Chung-King, chŭng-kĕng', China, a city in Szechuen, on the Yang-tze-Kiang, at its junction with the Kia-ling. It was declared open in 1890, and has acquired a thriving trade. There was a rebellion of the natives here in 1896–8, which checked progress. A railroad to centre at Chung-King is projected, and valuable coal-mines are to be worked. Pop. about 125,000.

Chuprah, chŭp-rä', or **Chaprah,** India, a town of Hindustan, in Bengal, on the Gogra, near its junction with the Ganges, 32 miles west-northwest of Patna. It is narrow, but extends along the river for four miles. It has government courts and offices, government English school, and is a station of the German Lutheran Mission. Pop. (1901) 45,400.

Chuquisaca, choo-kē-sä'ka, Bolivia, a department in the southeastern part of the country, bounded on the north by the department of Santa Cruz, on the east by Brazil, on the south by the department of Tarija, and on the west by the departments of Oruro and Potosi. Its area is variously estimated at from 40,000 to 73,000 square miles, the southern boundary of Bolivia not having been definitely determined The eastern portion is mostly level, the mountainous parts being in the west. There are large forests and grazing lands, and the soil, where cultivated, is found good for agriculture. Mineral deposits exist, the most valuable being silver, of which some is mined. Among the other productions are wheat, coffee, sugarcane, and cacao. The capital of the department, and also of the republic, is Sucre (q.v.). The population is about 285,000, embracing 80,000 civilized Indians and 8,000 whites, the rest being wild Indians.

Church, Albert E., American mathematician and military officer: b. Salisbury, Conn., 1807; d. West Point, N. Y., 30 March 1878. He was educated at West Point and was professor of mathematics there 1834–78. His mathematical works include 'Elements of Differential and Integral Calculus' (1842); 'Elements of Analytical Geometry' (1851); 'Analytical Trigonometry' (1857); 'Elements of Descriptive Geometry' (1865).

Church, Alfred John, English translator and author: b. London 29 Jan. 1829. He was educated at Lincoln College, Oxford; was ordained in the English Church in 1853, and after holding several head masterships, was professor of Latin in University College, London, 1880–8; and rector of Ashley, Gloucestershire, 1892–7. Beside publishing translations of Tacitus and Livy, he is the author of 'Stories from Homer' (1877); 'Stories from Virgil' (1878); 'A Traveler's True Tale, after Lucian' (1879); 'Stories from the Greek Tragedians' (1879); 'Stories from the East' (1880); 'The Story of Jerusalem' (1880); 'The Story of the Persian War' (1881); 'Stories from Livy' (1882); 'Roman Life in the Days of Cicero' (1883); 'The Chantry Priest of Barnet' (1884); 'With the King at Oxford' (1885); 'Two Thousand Years Ago, or the Adventures of a Roman Boy' (1885); 'Carthage' (1887); 'The Count of the Saxon Shore' (1887); 'Three Greek Children' (1888); 'To the Lions' (1889); 'Burning of Rome' (1891); 'Pictures of Roman Life and Story' (1892); 'Early Britain'; 'Bacon'; 'Callias'; 'Heroes of Chivalry'; 'Lords of the World'; 'Helmet and Spear'; 'Spencer'; etc. His books have been widely read in America.

Church, Arthur Herbert, English chemist: b. London 2 June 1834. He was educated at King's College, London, the Royal College of Chemistry, and Lincoln College, Oxford. He was professor of chemistry in the Royal Agricultural College, Cirencestor, 1863–79; and has filled the same position in the Royal Academy of Arts from 1879. He is the discoverer of the animal pigment known as turacin, and of churchite, a native cerium phosphate, and has published 'Precious Stones' (1883); 'English Earthenware' (1884); 'The Laboratory Guide' (7th ed. 1894); 'Food' (16th thousand, 1901); 'Josiah Wedgewood' (1894); 'Color'; 'Guide to Corinium Museum.'

Church, Benjamin, American soldier: b. Duxbury, Mass., March 1639; d. Little Compton, R. I., 17 Jan. 1718. He commanded forces with distinction in King Philip's war and in the famous battle of 1675 with the Narragansetts won renown. He captured and executed King Philip in 1676. 'Entertaining Passages Relating to King Philip's War' were compiled from his notes by his son Thomas.

Church, Benjamin, American physician: b. Massachusetts about 1710; d. 1776. He was graduated at Harvard; became noted for his patriotic writings during the decade preceding

the Revolutionary War, and was a leader in the "Boston tea-party." He secretly corresponded in cipher with the British, and, being detected, failed to exculpate himself. He was lost at sea while on a voyage to the West Indies.

Church, Francis Pharcellus, American editor: b. Rochester, N. Y., 22 Feb. 1839. He was the first publisher and editor of the 'Army and Navy Journal'; afterward, with his brother, he established and edited the 'Galaxy' magazine. He is a leading editorial writer on the New York *Sun*, with which he has been connected for a quarter of a century and is still a proprietor of the 'Army and Navy Journal.' He has published 'Life of Ulysses S. Grant' (1899); and 'Life of John Ericsson' (1891).

Church, Frederick Edwin, American landscape painter: b. Hartford, Conn., 4 May 1826; d. New York 7 April 1900. His earliest productions were views of the Catskill Mountains, among which he resided, and a view of East Rock, near New Haven, which attracted very favorable notice. In 1855 he visited South America, and found in the magnificent scenery of that country materials for several of his most admired pictures. After his return he executed his 'View of Niagara Falls from the Canadian Shore,' regarded by many as the most successful representation of the great cataract. Among his other works are 'The Heart of the Andes'; 'Cotopaxi'; 'Morning on the Cordilleras'; 'Under Niagara'; 'The Icebergs'; and 'Sunrise on Mount Desert Island.' After a visit to the Holy Land in 1868 he painted 'Damascus' (1869); 'Jerusalem' (1870); 'The Parthenon' (1871).

Church, Frederick Stuart, American artist: b. Grand Rapids, Mich., 1842. He studied at the National Academy of Design, and since 1885 has been a full member thereof. He has achieved note as a realist and is well known as a painter of figures and animals.

Church, George Earl, American soldier, engineer and explorer: b. New Bedford, Mass., 7 Dec. 1835. He was a member of the Scientific Exploring Expedition in South America in 1858; served in the Army of the Potomac 1862–5; and was war correspondent in Mexico for the New York *Herald* 1866–7. He made explorations in South America 1868–72; was United States commissioner to visit and report on Ecuador 1880; represented American Society of Civil Engineers at London Congress of Hygiene and Demography in 1891, and was president of the Geographical Society of the British Association in 1898. He is now resident in London where he is vice-president of the Royal Geographical Society.

Church, Irving Porter, American civil engineer: b. Ansonia, Conn., 22 July 1851. He was educated at Cornell University and has been professor of applied mechanics and hydraulics in the College of Civil Engineering there, from 1892. He has published 'Statics and Dynamics for Engineering Students' (1886); 'Mechanics of Materials' (1887); 'Hydraulics and Pneumatics' (1890); 'Notes and Examples in Mechanics' (1892).

Church, John Adams, American mining engineer: b. Rochester, N. Y., 5 April 1843. He was graduated from the Columbia School of Mines in 1867, was professor of metallurgy in Ohio State University 1878–81, and was four years in the service of Li Hung Chang in Mongolia, engaged in developing silver mines. He has published 'Notes on a Metallurgical Journey in Europe'; 'The Comstock Lode'; 'Report on Artesian Wells in Arizona.'

Church, Richard William, English clergyman: b. Lisbon 25 April 1815; d. London 9 Dec. 1890. He took a first-class at Oxford in 1836, and soon after was elected to a fellowship at Oriel. From 1853 to 1871 he held the rectory of Whatley, near Frome. In 1871 he became dean of St. Paul's Cathedral, London. In 1854 he published 'Essays and Reviews,' and thereby took rank almost at once as one of the most graceful and scholarly writers of the day. His university sermons 'Human Life and its Conditions' (1878); 'The Gifts of Civilization' (1880); and 'The Discipline of the Christian Character' (1885), are profound contributions to religious thought. Other works by him are 'Life of Anselm' (1871); 'The Beginning of the Middle Ages' (1877); 'Dante: an Essay' (1878); 'Spenser' (1879); 'Bacon' (1879); 'The Oxford Movement' (1891); 'Miscellaneous Essays'; 'Occasional Essays.' See 'Life and Letters of,' (1896).

Church, Samuel Harden, American writer: b. Caldwell County, Mo., 24 Jan. 1858. He is a railway official in Pittsburg, Pa., and has written 'Oliver Cromwell: a History' (1874); 'John Mannaduke,' a romance (1897); 'Corporate History of the Pennsylvania Lines West of Pittsburg' (1898–1900).

Church, William Conant, American journalist: b. Rochester, N. Y., 11 Aug. 1836. He became the publisher of the New York *Sun* in 1860, and was war correspondent of the *Times* (1861–2). In conjunction with his brother Francis (q.v.) he established the 'Army and Navy Journal' (1863), and the 'Galaxy' magazine (1866), and has been a contributor to the 'Century' and other periodicals.

Church. This word probably comes from the Greek *kyriakos*, dedicated to the Lord; the Scottish *kirk* and German *kirche* are forms of the same word. It has various meanings; in its widest sense it denotes the whole community of Christians, and was thus used by the New Testament writers. In more restricted significations it denotes a particular section of the Christian community differing in doctrinal matters from the remainder, as the Roman Catholic Church, the Protestant Church, etc.; or to designate the recognized leading church of a nation, as the English, Scotch, or French Church. It is applied in a sense which is manifestly too narrow, when it denotes merely the officers of the church, or clergy. In yet another sense it signifies the building in which Christians assemble for the worship of God, and, referring the reader to the separate articles on the sects into which the community is divided, we shall confine ourselves here to a few remarks, historical and descriptive, on *church* as denoting the edifice appropriated to Christian worship. When in the time of Constantine the persecuted Christians emerged from their meeting-places in upper rooms and in the Roman catacombs to bask in the sunshine of imperial favor, no buildings could be found fitter for their purposes than the

basilicas of Rome. The basilica was generally in the form of a parallelogram, with a semicircular apse at one end, which was raised, being approached by a semicircular range of steps. In the centre of this apse was the raised seat of the quæstor or other presiding magistrate; on each side, upon the steps, were places for the assessors, or those engaged on the business being transacted. In front of the apse was placed an altar, where sacrifice was performed before undertaking public business of any importance. The area of the building was divided by two rows of columns, the central division or nave being by far the broadest; over the two smaller divisions or aisles a gallery was often raised. In the small and dark Pagan temple there was neither room nor light enough to conduct Christian worship, but in such a building as above described, the whole congregation of the faithful could meet and take part in the act of worship. The bishop naturally took the place of the quæstor, the priests that of the assessors. The altar on which the pious Pagan poured his libations at the commencement of important business served equally well for the celebration of Christian rites. When in course of time the separation between laity and clergy became complete, the apse was railed off and appropriated to the use of the clergy, then the raised part on which the altar stood was separated by pillars called *cancelli*, and not allowed to be profaned by the multitude. Another change was the introduction of a choir, or enclosed space in the centre of the nave, round three sides of which the faithful congregated to hear the gospel read from two pulpits built into its inclosure on either side, or to hear the services read or sung by the inferior clergy, who occupied its precincts. As time wore on other modifications were introduced; on the erection of new buildings, the symbolic form of the cross was generally adopted as the most suitable for a Christian building; the arms of the cross (the transept) were railed off by rows of columns as the main building had been; at the point of intersection of the transept with the nave a tower was raised, which was at times surmounted by a small spire; frequently two towers were placed at the angles of the entrance end of the edifice. Over the greater part of Europe the style which came to be usually adopted for ecclesiastical buildings was the pointed Gothic, as lending itself more readily to a more majestic and ornamental treatment than the graceful Greek with its columned portico and rounded tower. Circular churches, which were popular at an early date, have found little imitation. The structures which are among the most notable in point of size or historic interest are alluded to in the article on CATHEDRALS. The ordinary churches are generally long rectangular buildings, without transepts, and the tower is placed so as to form the principal entrance, or at one of the angles of that end of the church. Of late years a taste for a superior style of building to that hitherto prevalent has sprung up, even among the dissenting bodies in England and the Presbyterians of Scotland. See ARCHITECTURE.

Church, an Organization of Christians. As understood to-day there are two widely different opinions regarding the meaning of a church, and both claim the New Testament as authority, (1) that Jesus Christ established a definite Church with a code of laws pertaining to belief and government; (2) that he gave us only moral instruction and no definite laws of belief or discipline. Under (1) may be classed those who claim that Jesus Christ established only one Church, and that the churches mentioned by Paul and others of the early missionaries, as recorded in the New Testament, were all parts of the one Church. Still others hold that the Christian Churches of the New Testament were each separate and distinct in government, but one in faith. The Roman Catholic, Greek, Church of England, and all Christian organizations with any generally recognized form of government, whether by presbyters or by the congregation, may be classed under (1). Under (2) will come all who hold that to observe the moral code as taught by Jesus Christ is all sufficient, hence this division need not be treated under the head Church.

The Roman Catholic definition of Church is: "The congregation of all the faithful, who being baptized, profess the same doctrines, partake of the same sacraments, and are governed by their lawful pastors under one visible head on earth, the Bishop of Rome." This implies unity of faith, morals, and government. The Greek definition is the same except they do not recognize as the visible head the Bishop of Rome. The Church of England definition is: "A congregation of faithful men, in which the pure word of God is preached, and the sacraments be duly administered in all those things that are of necessity requisite to the same." In the further authorized explanation of this definition it is shown that the government is given to the bishops without any authoritative head. The same definition is in general use by all other Christian Churches, but in some the government is vested in presbyters, elders, or officers acting as elders; in others the government rests in the congregation or members of the church.

Under the names of the various Christian denominations may be found further information regarding particular doctrines and forms of government.

Church-ale, formerly a church festival in England at which ale was drunk liberally; also the ale brewed for such a festival. The name is obviously compounded like bridal = bride-ale, scot-ale, clerk-ale, bid-ale, etc. The church-ales were usually held upon Whitsuntide, and two persons were chosen beforehand to preside over the feast, and divide out the victuals and drink voluntarily contributed by the parishioners. Sometimes the drink which had been brewed from malt given by the parishioners was sold about Whitsunday at the church for the support of orphans and poor, the repair of the church, and similar objects. The practice of holding church-ales with the corresponding games was denounced by the Puritans, and is not overlooked in Stubbs' 'Anatomie of Abuses.'

Church and State in the United States. That an indispensable function of any government is the conservation of public morals, and that an indispensable method of achieving it is to enforce the public exercise of some religious forms, seemed axiomatic to most people in the 17th century. The tenet that religion is best

promoted by leaving it to individual discretion was first evolved, naturally, by groups whose best hope was immunity, not establishment. These differing circumstances in the English colonies, with change of views from experience and change of policy from gain or loss of power, resulted in four chief attitudes of the colonial governments toward religion: (1) the establishment of a specific Church, and the taxation of the entire community to support it; (2) restriction of suffrage to church-members, without specifying the church — "theocracy"; (3) requirement of some church form and steady parish service in communities, without establishment of a specific church or disfranchising individuals; (4) entire religious liberty.

The first type is found in the chief Southern colonies and New England. Virginia came first, then Carolina before its division, the "Fundamental Constitutions" (see CAROLINA, ORIGINAL CONSTITUTION OF) merely shaping in this respect the provisions of Charles II.'s charter; lastly Maryland in 1691, after overthrowing the tolerant proprietary government. Each, from the nature of the case, established the Church of England. In New England the form of establishment was peculiar and *quasi*-casual; it was not statutory nor specific, but rested on local taxation to support a church which, owing to circumstances, was at first always the Calvinistic Congregational Church. When other church bodies began to grow, this taxation was remitted to all who supported a church of their own; those who were not thus *bona fide* contributing members to another church paid their cess to the Congregational as before. The second type is represented exclusively by the early Massachusetts Bay and New Haven colonies. The former, 18 May 1631, when as yet there was no popular representation in the colony, enacted "that no man should be admitted to this body politic but such as are members of some of the churches within the limits of the same." This restricted suffrage to one fourth the adult males, and was repealed 3 Aug. 1664. The latter, 4 June 1639, agreed "that church members only shall be free burgesses, and they only shall choose among themselves magistrates and officers" for public business. This, of course, perished with the absorption of the New Haven into the Connecticut colony, in 1662. The third type has but one representative, New York, including the Jerseys. This was "the Duke's" (afterward James II.) constitution, and is not the only ground for a less harsh judgment on him than prevails. The fourth type includes Rhode Island, the product of a quarrel with Massachusetts theology and politics, in which the founder's views developed by force of circumstances as he went on; Maryland, founded by a Roman Catholic who would not have been allowed to establish his own religion; Pennsylvania, equally limited to seeking immunity from persecution; and Georgia, founded late by an enlightened philanthropist.

The Revolution swept away all vestiges of establishment. The Constitution of 1787 provided against a danger not likely to recur. Article VI. enacts: "No religious test shall ever be required as a qualification to any office or public trust under the United States." This, however, did not touch the real likelihood if bigoted sectarians should control the government; the State conventions held to ratify the Constitution, urged a clause to guarantee full religious liberty; therefore the First Amendment begins: "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." Even this does not in the least debar individual States from doing it; but most of their constitutions decisively prevent that, not only by direct prohibition, but by enacting that no appropriation of public money shall be made to sectarian institutions. The stability of this provision, the impossibility of evading it, and its incalculable public value, have been proved many times over in the past half century. Sects holding the balance of power in States, or controlling their political managers, have striven desperately to support their institutions by public funds, and managers would have been glad to bribe their support with the money, but the evasions have been very few and insignificant. In the early years of the Union, efforts were occasionally made to have the legislatures enact some test to confine the government to Christians, for fear of atheistic or Jewish control; or to Protestants, in fear of Catholic supremacy; but the absurdity of the first two, and the impolicy of the last, as well as the improbability of its need, have prevented any approach to success. The only serious problem that has arisen on this point is due to Mormonism, where the claim to free exercise of their religion and its dictates is complicated by one of its ostensible revelations enjoining polygamy. The question is clearer if we imagine its enjoining thuggee, or other forms of crime directly subversive of public order. The community must decide how far a practice, not a mere theoretical belief, is inconsistent with its interests, and prohibition of anti-social acts is not interference with freedom of religion. In 1882 Congress prohibited polygamy under severe penalties; and the supreme court held this not in conflict with the constitutional provision above cited.

Church Army, a religious organization founded in London in 1882, with the object of training workingmen for church work among the laboring classes, to raise the lower classes of society, and to assist the deserving poor. The work is carried on through mission houses, labor homes, and by means of prison and workhouse committees.

Church Calendar. A systematic method of arrangement of the feasts of the Christian Church has long been in use, and the record of the time of these feasts is called the Church Calendar. Many of the feasts of the Church occur on a fixed day of the month, as Christmas, 25 December; All Saints', 1 November; Assumption, 15 August, and the feasts of the saints. The "movable" feasts are regulated from the feast of Easter Sunday. (For Easter see CALENDAR.) The fiftieth day after Easter Sunday is "Pentecost"; the eighth day after "Pentecost," "Trinity Sunday," etc. The fasts, except those of Lent, are regulated by the feasts, the records of which are found in the calendar. See also CALENDAR.

Church Discipline, the practice of the Christian Church in dealing with such of its office-bearers and members as have by public scandal caused hindrance to its common spiritual life. Its Scripture authority, resting on such passages as Matt. xvi. 19; xviii. 15 (*et seq.*),

is further enforced in Paul's epistles and in the gospel and epistles of John. Discipline, in the ecclesiastical sense, means the laws which are intended to govern the subjects of the Church in their conduct, as distinct from dogmas or articles of faith, which affect their belief. These laws may be based upon the Scripture and tradition or they may be the outgrowth of the condition of the times.

Church of England. See ENGLAND, CHURCH OF.

Church, Fathers of the (*patres ecclesiæ*), teachers and writers of the ancient Church, who flourished after the time of the apostles and apostolic fathers (the immediate disciples of the apostles), from the 2d to the 6th century. This name is also sometimes given to the teachers and writers of the following centuries, down to the schoolmen, who begin with the 12th century. A large number of their writings have been preserved, and have been published by modern scholars. The knowledge of their lives and their works constitutes a particular science, called patristics. The fathers of the Church introduced the Greek and Roman learning into Christian treatises, and many of them were as able as they were learned. Most of the earlier fathers of the Church, before their conversion to Christianity, were rhetoricians or advocates, which accounts for several peculiarities, as well in their method of disputing as in their style. The object of their writings is to defend the Christian religion and the Christian community, refute the Jews, pagans, and heretics, explain the Holy Scriptures, set forth the doctrines of their faith, and the rules of their morality, also the history of Christianity and the Christian Church, and impart instruction to the people. The contents of these writings, therefore, are apologetic, exegetic, dogmatic, moral, historical, polemical, or ascetic. The fathers of the Church are divided into two chief classes — Latin and Greek. The most celebrated among the Greek fathers are Clement of Alexandria, the first who philosophized on Christianity; Origen, distinguished for his homilies and his apologetic and exegetic writings; Eusebius, who wrote the first history of Christianity; Athanasius, who had a decided influence upon the formation of the Christian dogmas; and Chrysostom, the most admired of the ancient Christian orators. The most distinguished among the Latin fathers are Tertullian, a writer of great originality; Augustine, a man of a peculiar and vehement mind, the oracle of the Western Church; Ambrose, distinguished as a Christian orator; and Jerome, a man of much learning, and particularly happy in explaining the Holy Scriptures, whose efforts, however, contributed much to awaken in the West an admiration for the renunciation of the world and the celibacy of priests. Migne's Patrologiæ Cursus Completus gives the works of the fathers and many later writers in 388 volumes. Translations are contained in the 'Library of the Fathers of the Holy Catholic Church,' edited by Pusey, Keble, and Newman; and in the Ante-Nicene Christian Library. See also Farrar, 'Lives of the Fathers' (2 vols.).

Church of God, an American Christian sect which originated in Harrisburg, Pa., 1830, in a movement in which John Winebrenner, previously a minister in the German Reformed Church, was most prominent. A new society was organized by him, and others who accepted his views, which took the name of the Church of God. It exists principally in Pennsylvania and the Western States. The government of the Church of God is Congregational, with a supervising Church Council, composed of the preachers in charge, the elders, and deacons. Associations, or conferences of Churches, called Elderships, meet annually, and a General Eldership meets every three years. The church holds the doctrines of the Evangelical churches, with baptism by immersion only, subsequent to faith it practices feet-washing; the administration of the Lord's Supper in the evening; all the instrumentalities of revivals; and protests against the traffic in intoxicating drinks. In 1900 there were 460 ministers, 580 church edifices, and 38,000 communicants. The church property was valued in the same year at about $750,000. The denomination publishes several newspapers, and sustains a college at Findlay, Ohio. See WINEBRENNER.

Church of God in Christ, a recognized body of Mennonites, one of the 12 sects in the United States, about 500 in number. They differ slightly from the regular Mennonites in matters of church government. See MENNONITES.

Church Government, the regulation and ordering of spiritual matters, or those pertaining to the discipline and work of the Church. Four leading views are at present entertained regarding church government. The first three agree that the rudiments of a scheme of church government are laid down in the New Testament. They differ, however, as to what that scheme is, much the greater number believing it to be Episcopacy, though one large minority are in favor of Presbyterianism, and another in favor of Congregationalism. The fourth view, which has not a large number of advocates, is that no scheme of government was laid down in the New Testament, applicable to all times and places, but that the church has the power of adapting its government to the special circumstances in which it finds itself at any particular time. See CHURCH, AN ORGANIZATION OF CHRISTIANS.

Church of the New Je'rusalem, the name taken by a body of Christians who base their belief on the teachings of Emanuel Swedenborg. This sect was founded in 1787, 12 years after the death of Swedenborg, by 15 of his ardent disciples. The founders of the church claim that Swedenborg had a special revelation which authorized him to teach,— as real a command to go forth as was given to the apostles. The system of Christian Doctrine held by this church differs in distinctive points from that held by other Christian churches. They believe of God that he is the creator of all things, that Jesus Christ is God, and that God is all truth, all beauty, all good. The Scriptures are held to be revelations from God through man; and the teachings regarding the future life, are direct revelations from persons of the other world to Swedenborg himself.

The church was established first in England, then the United States, Canada, and in a few places in other parts of the world. In the United States and Canada there are 107 societies, 95 ministers, and about 6,500 members. The active members of the church claim that in

the United States and Canada there are altogether about 12,000 believers. For a fuller account see NEW JERUSALEM CHURCH; see also SWEDENBORG, EMANUEL.

Church History, the history of any church, but especially of the Christian Church. Church history naturally divides itself into four periods: From the advent of Christ to the time of Constantine; from Constantine to Mohammed, or by the arrangement of Mosheim and others, to Charlemagne; from Mohammed, or alternately from Charlemagne to the Reformation; from the Reformation to the present time. This division of the subject is not always followed; some authors regard the great periods in Church history, as: Foundation, Persecution; Extension; Reformation. See CHRISTIAN CHURCH, THE.

Church-rate, in England, a rate raised for the purpose of repairing and sustaining the church, churchyard, and for similar objects. It was made by the churchwardens with consent of the parishioners, who fixed the amount, but could not refuse it altogether, as in that event the churchwardens were empowered to levy a rate for necessary purposes. The rate, though applicable for repairs to parish churches only, was requirable from parishioners of all religious denominations. This often gave rise to complaints, and these led to repeated proposals for its commutation or entire abolition. This last, so far as the rate was compulsory, was effected in 1868.

Church, States of the, the Pope's dominions in Italy. They arose with the grant of Pepin, king of the Franks, in 754, who bestowed on Pope Stephen II. some districts which the Lombards, against whom Stephen II. solicited Pepin's assistance, had taken from the Exarchate of Ravenna. Charlemagne confirmed this grant in 774, and in return received the title of Roman Emperor from Leo III. in 800. The wise policy of the Popes in conferring favors on the Normans in Lower Italy secured to them in these vassals staunch protectors of the holy see. The structure of the papal power was fully completed in 1075 under Gregory VII. The dominions of Matilda of Tuscany were added to the states of the Church by her request, and the Popes maintained possession of them against all the claims of the German emperors. The papacy removed a dangerous neighbor belonging to the house of Hohenstaufen by raising the house of Anjou to the throne of Naples in the year 1265. The frequent revolutions of the Romans and the influence of the French led the Popes of the 14th century to transfer their residence, from 1305 till 1376, to Avignon, which Clement VI. bought of Joanna, queen of Naples and countess of Provence, in 1348. As this change of residence was made, it was charged under the influence of the king of France, it never obtained the full assent of the Romans and Germans, and anti-popes were sometimes elected by the opposing factions, and the welfare of the Church as well as of the state suffered by their mutual hostilities. After 20 years of exile the Popes returned to Rome. Julius II. added Bologna to the papal dominions in 1513, and Ancona in 1532. The Venetians were obliged to restore Ravenna. Ferrara was also recovered from Modena in 1598, and Urbino was bequeathed to the papal chair in 1626 by its last duke, Francis Maria, of the house of Rovera. The wise administration of Sextus V. restored internal order toward the end of the 16th century; but the extravagance and family partialities of some of his successors created fresh disorder. Subsequently Naples renounced her feudal obligations to the papal chair. After the successes of the French in Italy the Pope was forced at the Peace of Tolentino, 13 Feb. 1797, to cede Avignon to France, and Romagna, Bologna, and Ferrara to the Cisalpine republic. An insurrection in Rome against the French, 28 Dec. 1797, caused the annexation of the states of the Church to the Roman republic. Pius VI. died in France. The victories of the Russians and Austrians in Italy favored the election of Pope Pius VII., 14 March 1800, who, under the protection of Austrian troops, took possession of Rome. By the concordat concluded in 1801 with the First Consul of the French republic the Pope again lost a great part of his temporal dominions. In 1807 France again declared war, and the provinces of Ancona, Urbino, Macerata, and Camerino were added to the kingdom of Italy. The possessions of the Church beyond the Apennines were all that remained to the Pope. On 2 Feb. 1808, a French corps of 8,000 men entered Rome; the remainder of the papal states were added to France, and a pension of 2,000,000 francs settled on the Pope, whose ecclesiastical power was guaranteed by Napoleon. The decree of 17 May 1809 put an end for the time being to the ecclesiastical state. The Pope was held a prisoner in France until the events of 1814 again permitted him to take possession of his states. Pius VII. was succeeded by Leo XII., who reigned from 1823 till 1829. He was succeeded by Pius VIII., who, in his turn, was succeeded by Pius IX. in 1846. The first acts of this Pope were characterized by such a liberal spirit that diplomatic Europe was surprised. The events of 1848 caused the Pope to pause in his advanced policy, which so dissatisfied the extreme liberal party that they drove Pius IX. from Rome, and the reins of government fell into the hands of Garibaldi, Mazzini, and Avezzano (1849). Some few months afterward the French government, resolving to restore the papal authority, sent Gen. Oudinot with an army against Rome. Defeated in their first attack on the city, the French began a siege in regular form, and in a month's time were masters of it. Pope Pius did not return to Rome, however, until the following year.

After the Austro-Italian war of 1859 the papal see was stripped of the greatest part of its territorial possessions. Embracing before that date an area of 17,218 square miles, with 3,124,668 inhabitants, the Roman territory was then reduced to 4,891 square miles, and 692,106 inhabitants. Of the former legations and delegations into which it was subdivided only five remained, namely — Rome and the Comarca, Viterbo, Civita Vecchia, Velletri, and Frosinone. From 1860 to 1866 the papal government was sustained by the presence of a French army, which was withdrawn in 1866 upon the King of Italy binding himself by treaty to respect the integrity of the Roman states. In 1867, however, revolutionists numbering 15,000, belonging to the Italian party of action, entered the papal territory, headed by Menotti Garibaldi. They made but

little progress until the elder Garibaldi placed himself at their head. Napoleon III., at the earnest prayer of the Pope, sent an army to protect the city against the violence of the revolutionists, who had now surrounded it. On 28 October the French entered Rome, and Garibaldi, beginning to perceive that he would be hemmed in by the regular Italian forces under Cialdini, thought of retreating. An advanced section of the papal troops came in contact with the Garibaldians (3 November), and were likely to have suffered severely had not two French battalions, armed with the Chassepot rifle, come speedily to their aid. Garibaldi, with 4,000 men, retreated into the Italian territory, where they were disarmed. A strong force of French troops were left in occupation of Civita Vecchia after peace was restored, and the Pope seemed as secure as ever. But the outbreak of the Franco-German war changed the aspect of affairs. The French army of occupation left Rome on 30 July 1870, and the Pope was at the mercy of his powerful neighbor, Victor Emmanuel, king of Italy, who, seizing the opportunity, marched upon Rome and took it by force of arms. In September the Italian troops occupied Rome. In October the states of the Church were incorporated with the kingdom of Italy, a plebiscite was held under bayonet-rule, the count of which resulted in 133,681 in favor of the Sardinian occupation and 1,807 against it. In the beginning of July 1871, Rome became the seat of the Italian government and the residence of the court.

Church Temperance Society, a national organization of the Anglican Church in the United States. It was founded in New York in the year 1881, and its object is to promote temperance by means of high license. It seeks to influence state legislators and municipal authorities, and it has done most effective work in providing substitutes for the saloon. The organization in the United States follows, in a measure, the methods used for several years by the Church of England Temperance Society.

Churchwarden, one of two Episcopalian parochial officers chosen annually at the Easter vestries. In Anglican Churches in the United States the wardens are usually elected by the parishes; in England the custom prevails of the rector appointing one warden and the parish the other. Their duties are to protect the building of the church and its appurtenances, to superintend the ceremonies of divine worship, and the proper distribution of alms, etc.; to form and execute parochial regulations, and generally to act as the legal representatives of the parish. They usually attend to the secular affairs of the parish.

The term "churchwarden" is also given to a long-stemmed clay tobacco-pipe much used in Great Britain. A famous "make" of this class of pipes is located in the town of Broseley, in Shropshire.

Church'ill, Charles, English satirical poet: b. Westminster, February 1731; d. Boulogne, France, 4 Nov. 1764. He took orders in the Established Church, but reflected very little credit upon his clerical profession. He won his fame with 'The Rosciad,' a satire upon the actors of the time, in which only Garrick and some few popular actresses are praised. His capacity for ridicule was so great that 'The Ghost,' 'The Farewell,' 'The Conference,' 'The Author,' and 'The Prophecy of Famine,' proved exceedingly popular. He is almost without a peer in his special field.

Churchill, John, Duke of Marlborough. See MARLBOROUGH.

Churchill, Randolph Henry Spencer, LORD, English statesman, third son of the 7th Duke of Marlborough: b. 13 Feb. 1849; d. London 24 Jan. 1895. He was educated at Merton College, Oxford, and having entered Parliament in 1874 as member for Woodstock, by 1884 he had risen to the position of a recognized leader of the Conservative party, and in 1885 became Indian secretary in Lord Salisbury's government. His tenure of this office was rendered notable by the annexation of Upper Burma. On the defeat of Gladstone's Irish bill in 1886 Churchill became leader of the House of Commons and Chancellor of the Exchequer, posts which he unexpectedly resigned in December 1886. He was a brilliant though at times rather violent personality in British politics. His opinions were mainly Conservative, but he often found himself in opposition to the official leaders of that party; and for some time he acted as the leader of what was known as the Fourth Party, consisting of four members who adopted a somewhat independent position. He married in 1874 Jennie Jerome, a daughter of Leonard Jerome, of New York. In July 1900, Lady Randolph Churchill married George Cornwallis West.

Churchill, Winston, American novelist: b. St. Louis, Mo., 10 Nov. 1871. He was graduated from the United States Naval Academy in 1894, and became an editor of the 'Army and Navy Journal' the same year. After serving as managing editor of the 'Cosmopolitan' magazine, he turned his attention to fiction. He has written: 'The Celebrity' (1898); 'Richard Carvel' (1899); 'The Crisis' (1901); 'Mr. Keegan's Elopement'; 'The Crossing' (1904).

Churchill, Winston Leonard Spencer, English soldier and author: b. 30 Nov. 1874. He was the son of Randolph H. S. Churchill (q.v.), and was educated at Harrow and Sandhurst Military College. He served with the Spanish forces in Cuba, and in the English army during a part of the Boer war 1899–1900. He has published 'The Story of the Malakand Field Force' (1898); 'The River War' (1899); 'Savrola' (1900); 'London to Ladysmith, via Pretoria' (1900); 'Ian Hamilton's March' (1900.)

Churchill River, a river of the Northwest Territories of Canada, which rises in La Crosse Lake, forms or passes through various lakes or lake-like expansions, the largest being Big or Indian Lake, and enters Hudson Bay near Fort Churchill, after a northeasterly course of about 800 miles. It is called also Missinnippi, English and Beaver. Except by means of frequent portage, it is not navigable.

Churching of Women, a rite founded on the Mosaic injunction found in Levit. xii. 6-8, and as practised in some denominations, is now a giving of thanks for the birth of a child. The first mention of the subject as a usage in the Christian Church is found in the pseudo-nicene Arabic Canon, but no prescribed form is given.

In the Greek Church the presentation of the child is made on the 40th day after birth, according to Luke ii. 22. The Roman Catholic Church imposes no obligation upon its members in this respect, but recommends it as a laudable and pious custom. The form is prescribed by the Roman Catholic ritual. The priest sprinkles with holy water the woman who kneels at the altar-railing and holds a lighted candle, and having recited the 23d Psalm, he puts the end of his stole into her hand and says: "Come into the temple of God; adore the Son of the Blessed Virgin Mary, who has given thee fruitfulness in child-bearing." The priest then says a prayer of thanksgiving, blesses her, and sprinkles her with holy water in the form of a cross. The rubric of the Roman Catholic ritual reserves this rite for women who have children born in wedlock. The Anglican Church provides in the prayer book a prescribed form for the ceremony. The Congregational, Presbyterian and other churches either ignore, or declare that there is no scriptural warrant for the rite.

Churchus, a deity worshipped by the ancient Prussians. It presided over food and drink.

Churl, chėrl (Saxon *ceorl*) in modern usage, a rude, boorish person, but in Saxon England, the term denoted a common freeman. The rank of the churl, or ceorl, steadily declined until finally the only important distinction between churl and serf was that the former might choose his own master. The better class of churls sometimes found their way into the class of theyns, or thanes, corresponding to the knights of post-Conquest times, while the others became the villains of the Norman feudal organization. 'Domesday Book' makes no mention of the word ceorl.

Churn, a vessel in which cream is agitated to separate its buttery globules in a solid mass from the fluid portions. The length of time usually occupied by this process, and the fatigue consequent upon working those machines by hand, have caused the ingenious to produce numerous modifications in form and size. Some may be worked by dogs in the way a squirrel-wheel is driven; others may be worked by horse-power; and in some cases steam is the motive power. The ordinary plunge-churn, with its cylindrical box, its straight rod projecting downward through the cover and attached below to the dasher, has been greatly improved by an arrangement by which the air is introduced into the cylinder at every stroke by a tube run right along the handle, with a valve at its end which opens as the dasher rises and closes as it sinks. The air is thus dashed through the cream, separating it into innumerable small particles, and throwing it into a state of foam. A box form of churn, with dashers attached to a rod passing horizontally through the box, and driven by a winch, is frequently used. Less common kinds are those in which the whole body of the machine is set in motion, such as the rocking-churn and the barrel-churn. A churn on the centrifugal principle has been introduced into Sweden. Though the rapid completion of the process of butter-making is the principal end in view, it is a well-known fact that butter suffers seriously by too rapid a process. When butter forms in about 45 minutes it is sure to be good; when it appears sooner it is soft; when later, strong-tasted. See BUTTER; DAIRY.

Churrus, chŭr'rŭs, the resinous exudation of the leaves and flowers of Indian hemp, *Cannabis indica.* It is used by the natives of India as an intoxicating drug. According to Jaffur Shurreef, a man covers himself with a blanket and runs through a field of hemp early in the morning; the dew and gum of the plant naturally adhering to it are first scraped off and the blanket afterward washed and wrung. Both products are boiled together and an electuary formed. The smoking of five grains of it will produce intoxication.

Churubusco, choo-roo-boos'kō, **Battle of,** one of the principal engagements of the Mexican war, took place 20 Aug. 1847. Contreras (q.v.) was won in the early morning, Churubusco in the forenoon and early afternoon, of that day, but they are quite distinct battles. The main road north to the city of Mexico, via San Augustin and San Antonio, an elevated paved causeway, converges with that on the west from Contreras and Coyoacan at Churubusco, a village six miles south of the capital and a mile northeast of Coyoacan. Just north of it runs east and west the little stream called Rio Churubusco, crossed by the main road at a bridge fortified with a bridge-head; there was a strong bastion 75 to 100 yards on a side, with embrasures sweeping the San Antonio road. Along the sides were cornfields, maguey plantations, hedges and thickets, and irrigating ditches full of water. In the western part of the village, southwest of the bridge-head, on the Coyoacan road, was the Convent of San Pablo, a massive building with walls so thick that field-pieces could make no impression on them, defended on two sides by strongly built bastions with six or eight heavy guns, and the building itself an impregnable cover for musket-fire. Around it was a flooded moat, in front were cornfields and thickets. The two points to be carried were the convent and the bridge-head; and since, after the rout at Contreras, this was the last place where the Mexicans could make a stand short of the city of Mexico, the resistance was likely to be desperate. The wreckage of Contreras was being pursued by Pillow and Twiggs along the Coyoacan road; and Worth, having turned the works at San Antonio on the main road, had captured a considerable body of the enemy, and was advancing along the causeway. Santa Anna threw a battalion into the convent, placed five guns and a heavy body of troops at the bridge-head, and posted several regiments along the north bank of the stream. The first assault was made on the convent. Bennet Riley's and Persifor F. Smith's brigades, Dimick's and Taylor's batteries, attacking it from the west and south, were received with a storm of shot and shell from the guns in embrasures and barbette; and as they struggled out of the cover they were swept by the musket-fire from the building itself, with heavy loss. Seizing a line of adobe buildings 60 yards from the convent, they opened fire under that protection and held it till the time for advance. Meantime Worth's division, with Pillow, Cadwalader, Garland, Clarke, and others, had charged down the causeway, blocked for several hundred yards with loaded wagons, and through the fields to the bridge-head. Broken into irregular fragments by the hedges and ditches, they were twice repulsed with tremendous loss by the

plunging fire of the Mexican guns; but Shields had moved north from Coyoacan and, after a fierce combat, which nearly overwhelmed him, he was reinforced by Lee and Sumner, carried the river line, and moved east against the rear of the bridge. In danger of having their retreat from the capital cut off, the Mexicans lost nerve, and a third charge from the Americans carried the head with a rush. Thence they turned southwest against the convent; the American artillery was still battering it on the other side; a sally from the garrison was driven back and, as the fire slackened, both divisions of the Americans entered it from opposite sides at the same time. The American forces in this battle numbered a little over 7,300; the Mexican numbers are uncertain, but probably about 25,000. The American losses at Contreras and Churubusco together were 1,053, not over 100 at Contreras. The Mexican loss was 2,637 prisoners at both, and probably 2,000 at least killed and wounded at Churubusco. Consult Wilcox, 'History of the Mexican War' (1892.)

Chusan (choo'sạn) **Archipelago,** a group of islands off the east coast of China, the largest being the island of the same name, which is about 21 miles long, and from 6 to 11 broad, with a population of about 200,000. Its surface is finely diversified by hill and dale. The rocks are evidently volcanic; and the soil, often very fertile, is under good cultivation, for the most part by spade husbandry. On the same slope may be seen, in different stages of their growth, wheat, tea, sweet potatoes, cotton, and tobacco. There are several towns on the island; the capital is Ting-hae, a walled town of about two miles in circumference. From its situation near the mouths of the Yang-tse-kiang, which forms the great channel of communication with the heart of the empire, Chusan is considered as the key of southern China, and was accordingly taken possession of by the British on two occasions during the first Chinese war. Notwithstanding the great mortality among the British troops during their occupation of the island, the climate is still considered healthy.

Chutia Nagpur, choo'tē-ạ nāg-poor'. See CHOTA NAGPUR.

Chutney, chŭt'nĭ, a condiment compounded of sweets and acids, much used in the East Indies, and thence introduced into England and the United States. Ripe fruit, raisins, spices, herbs, chillies or cayenne, lemon-juice, vinegar, etc., are the ordinary components, which are pounded, well boiled together, and then bottled for use. It is much eaten in India with curries, stews, etc.

Chuz'zlewit, Martin, the principal character in Charles Dickens' novel of that name.

Chyle, kīl, the liquid mixture of food-stuffs taken up by the lacteals from the intestine in the course of digestion. It is not a definite substance, its composition varying very widely according to the character of the ingested food. See DIGESTION; LACTEALS.

Chyme, kīm, a pulpy mass into which food in the stomach is resolved by the action of the gastric juice and by the contraction of the stomach. This mass is grayish in color, and the previous texture or nature of the aliment can be no longer distinguished. It passes by the pylorus into the intestinal canal, where it is mixed with the pancreatic juice and the bile. The thinner parts of it are absorbed by the slender tubes termed "lacteals." The liquor thus absorbed, which is called "chyle," (q.v.), is of a white color; it passes through the glands of the mesentery, then enters the thoracic duct, and is conveyed by it into the blood at the junction of the left jugular with the left subclavian vein. Chyle is an opaque milky fluid, mild to the taste. By standing for some time one part of it coagulates, another portion is coagulated by heat. The chyle, after mixing with the lymph conveyed by the absorbent vessels, is received into the blood, which has returned from the extreme vessels before this passes to the heart. All traces of it are very soon lost in the blood, as it mixes perfectly with that fluid. It is probable, however, that its nature is not immediately completely altered. The blood passing from the heart is conveyed to the lungs, where it circulates over a very extensive surface presented to the atmospheric air, with the intervention of a very thin membrane, which does not prevent their mutual action. During this circulation the blood loses a considerable quantity of carbon, part of which, it is probable, is derived from the imperfectly assimilated chyle, as this, originating in part from vegetable matter, must contain carbon in larger proportion than even the blood itself. See DIGESTION; LYMPH; NUTRITION.

Cialdini, Enrico, ĕn-rē'kō chäl-dē'nē, Italian military officer: b. Castelvetro, Modena, 10 Aug. 1811; d. Leghorn 9 Sept. 1892. By his share in the insurrection of 1831 was forced to escape to France, and in 1835 passing over to the Spanish service, he fought against the Carlists and was made colonel. When Charles Albert headed the Italian rising in 1848, he was employed by the Sardinian government to reduce the volunteers to discipline, and fought at the head of his new regiment in the brief campaign of 1849. In the Crimea he commanded a division of the Sardinian contingent; and on his return was appointed aide-de-camp to the king. He was intrusted by Cavour with the formation of the famous Cacciatori delle Alpi. In the war of 1859 the victory at Palestro was his chief exploit. In 1860 he defeated the papal army at Castelfidardo; in 1861 Gaeta and Messina yielded to him. Created Duke of Gaeta, and for a few months governor of Naples, he had to act against Garibaldi in the second Sicilian expedition (1862). In 1864 he became a senator; and in the war of 1866 occupied Venice almost without a blow. In 1876 he was sent as ambassador to Paris, but he retired in 1881, and received the post of one of the two generals of the army.

Ciampi, chäm'pē, **Ignazio,** Italian poet and historian: b. Rome 1824; d. 1880. From 1874 till his death he was professor of modern history in the University of Rome. Among his poetical works are some imitations of the Russian Pushkin; an epic, 'Stella'; and two volumes of 'Various Poems.' He wrote several works on the history of literature, also biographies and histories of special periods. His principal work appeared posthumously: 'Modern History,' from 1492 to the Peace of Westphalia.

Ciampi, Sebastiano, Italian scholar: b. Pistoia 30 Oct. 1769; d. Florence 14 Dec. 1847.

Ordained as a priest in 1793, he was appointed professor at the University of Pisa in 1803; owing to some misunderstanding with his colleagues, he accepted in 1818 a professorship at Warsaw, and returned to Italy in 1822, a prebend having been conferred on him in Poland, which enabled him to devote himself to literary studies at Florence. His principal works treat of Italian literature and art, of ancient literature, of the Latin literature of the Middle Ages, and of the history of Poland.

Ciampoli, Domenico, dō-mā'nē-kō chām-pō'lē, Italian novelist: b. Atezza in Abruzzi 25 Aug. 1855. His stories and romances are to a great extent pictures of life among the peasantry and mountain folk of southern Italy. He has also written romances of a less local character: 'Diana'; 'The Unknown.' He has devoted special study to Slavic literature, and published several volumes on that subject.

Cibao, se-bā'ō, a mountain range in the central part of Santo Domingo; length about 20 miles. When Columbus discovered the island, he was told by the natives that there was gold in the Cibao and he thought it to be a part of Japan. Gold was found there in 1494, by Ojeda.

Cibber, sīb'bėr, **Caius Gabriel,** Danish sculptor: b. Flensborg, Holstein, 1630; d. London 1700. He visited England during the protectorate of Cromwell, and met with such encouragement as to induce him to settle there. He was employed to execute the bas-reliefs on the pedestal of the London Monument. The work, however, by which he is principally known are his figures of Raving and Melancholy Madness, formerly erected above the gate of the old Bethlehem Hospital, and now in the new hospital, St. George's Fields. He was the father of Colley Cibber (q.v.)

Cibber, Colley, English dramatist and actor: b. London 6 Nov. 1671; d. there 12 Dec. 1757. He was a son of C. G. Cibber (q.v.) and the sculptor's second wife, Jane Colley. He made his appearance at Drury Lane Theatre in 1689. In 1695 appeared his first comedy, 'Love's Last Shift,' which met with great success. In this piece he played the part of Novelty, a fashionable fop. This character is found in most of his pieces, and in the representation of it he was likewise distinguished. His dramatic celebrity is founded chiefly on the 'Careless Husband,' which even obtained the approbation of his declared enemy, Pope. This piece, though without novelty in the characters, and without invention in the plot, is a good picture of the manners and follies of the time. His comedy, the 'Non-juror', an imitation of Molière's 'Tartufe,' adapted to English manners, appeared in 1717, and was directed against the Jacobites. It was very successful, but drew upon him many enemies, whose number he increased by his conduct as director of Drury Lane Theatre, from 1711. His appointment as poet-laureate in 1730 gave full play to the raillery of his enemies. Cibber had the good sense to join in the laugh against his own verses. Pope, however, did not cease to ridicule him on every opportunity. Besides writing original works for the stage, he adapted a great number of others, the acted Richard III. being one of those that have passed through his hands. In 1750 he quitted the theatre, and published the 'Apology for the Life of Colley Cibber,' written with spirit and candor, and containing many entertaining anecdotes and judicious remarks.

Cibber, Susannah Maria (Arne), English actress: b. London February 1714; d. there 30 Jan. 1766. She was the sister of the celebrated Thomas Arne (composer of 'Rule Britannia'), who taught her music, and introduced her in one of his operas at the Haymarket Theatre. She was so much of a favorite with Handel, that he composed pieces expressly adapted to her voice, and used to instruct her in singing them. In 1734 she married Theophilus Cibber (q.v.), but was soon after separated from him. She subsequently made her appearance in tragedy. Her beauty and her talents gained her universal admiration. Garrick is said to have exclaimed when informed that she was dead, "Then tragedy has expired with her." She is buried in Westminster Abbey.

Cibber, Theophilus, English actor and dramatist: b. 26 Nov. 1703; d. Oct. 1758. He was the son of Colley Cibber (q.v.). Among his plays are: 'The Lover' (1730); 'Patie and Peggy' (1730); 'The Auction.' The 'Biography of English and Irish Poets,' which appeared under his name, was from the pen of Robert Shiels, a Scotsman, who purchased for 10 guineas the right of prefixing to the work the name of Cibber, then in prison for debt.

Cibol, sīb'ōl, a perennial plant (*Allium fistulosum*) of the onion genus, a native of Siberia, with hollow stems larger than those of the chive. It was formerly cultivated in Great Britain for culinary use, but it has been superseded by more palatable species. See Onion.

Ciborium, sī-bō'rī-um, the sacred vessel, of silver or gold or silver-gilt, and often incrusted with precious stones, in which the sacred host or sacramental bread is reserved. Its liturgical name is pyx. In the language of architecture, ciborium is the name of the canopy which overhangs the high altar of a church.

Cibrario, Luigi, loo-ē'jē chē-brä'rē-ō, Italian historian and politician: b. Turin 23 Feb. 1802; d. Salo 1 Oct. 1870. He studied law, entered the service of the State, and soon distinguished himself by his historical investigations. In 1848, when Italy rose against the Austrians, Charles Albert appointed him commissioner at Venice and a senator of Sardinia. In 1852 he was made minister of public instruction, and ultimately, in 1855, minister of foreign affairs. In 1839 he published his 'Della Economia Politica del Medio Evo'; in 1840, his 'Storia della Monarchia di Savoia'; and in 1847, his 'Storia di Torino.' He published numerous other works on history, numismatics, and miscellaneous subjects.

Cicacole, sīk-ą-kōl'. See Chicacole.

Cicada, sī-kā'dą, a large insect of the order *Hemiptera,* sub-order *Homoptera,* and family *Cicadidæ,* known by its broad head, protuberant eyes, sucking beak, and a well-developed ovipositor. The male cicada makes a shrill noise by means of a special apparatus at the base of the abdomen or hind-body. The loud, piercing notes issue from a pair of structures or cavities on the under side of the body, which act somewhat as two kettle-drums or "timbals," each cavity being covered by a tense membrane which is rapidly vibrated by means of two special mus-

cles within. The sound is variously modified by adjacent smaller disk-like sounding-boards, which increase and transmit the sound vibrations caused by the movement of the membrane. The sound is modified by the semicircular disks, one on each side projecting from the metathorax over the "mirrors," cover-plates, or sounding-boards, one on each side, and which, when closed, deaden the sound, or, if open, allow it to escape in greater volume. This apparatus appears to be homologous with the "ears" of the locusts or common grasshoppers. Cicadæ have an incomplete metamorphosis, the young (nymphs) being like the parents, but without wings; they live attached by their beaks to the roots of trees, etc. The female deposits her long, slender, cylindrical eggs in gashes in twigs made by her saw-like ovipositor. From 400 to 600 eggs are laid, the process requiring about 45 minutes. The 17-year cicada (wrongly called 17-year locust) is the longest-lived of any known insect, as the grub or nymph lives for over 16 years sucking the roots of forest trees, often several feet below the surface; in the late spring it finishes its transformations, and usually at the last of May or the beginning of June, issues in enormous numbers from the ground. This appearance of a 17-year brood in a given area has been recorded as far back as 1633. At the present time each year has its brood or broods, each limited, as a rule, to a well-defined district. Of such broods there are 30, occurring over a large area in the Atlantic and Central States. In southern New England a brood periodically appears near Fall River and on Martha's Vineyard, as well as in Connecticut, while in Rhode Island its first appearance known in history was in the first week in June 1903, in the town of Coventry, near Tiogue reservoir. The southern limits are northern Georgia and the western limits are eastern Nebraska and Kansas. Besides this 17-year brood there is a 13-year brood, which is more southern, the dividing line being about latitude 38°; this appears to be a temperate variety. The male is very short-lived and takes no food. The females live for several weeks and deposit their eggs about the middle of June in New York and West Virginia. The young hatch, dropping to the ground about six weeks after the eggs are laid; it then burrows into the soil and begins to pierce the rootlets of trees. The nymph molts about once a year or oftener, and Riley estimates the number of molts at from 25 to 30, while there are six stages of growth before the imago or winged state is assumed. Consult: Riley, 'The Periodical Cicada' ('Bulletin 8 U. S. Department of Agriculture'); Marlatt, 'The Periodical Cicada' (Ibid. 14).

Cicatrization, sik"ạ-trĭ-zā'shŏn, the process of healing in the skin of an ulcer or a wound. Where a solution of continuity of the skin is made the blood is thrown out into the gap, the edges of the wound are gummed together by serum, and, springing from both sides of the wound, new connective tissue is formed. This new connective tissue gradually fills the wound with a white glistening mass, the cicatrix. This contracts, and all that may be left of the wound is a white shiny strip of new connective tissue.

Cicely, Sweet, a plant of the United States belonging to the natural order *Umbellifer,* a perennial herb growing from fleshy, clustered, thickish roots. There are about 15 species in North America, western South America, and eastern Asia, grouped into the genus *Washingtonia,* so named in honor of George Washington. Eleven of the 15 are natives of the western United States. They are related to chevril (q.v.) on one side, and to *Scandix* on the other. The smoother sweet cicely (*W. longistylus*) grows in the woods of southern Canada, through Dakota, eastward to North Carolina, southward to Tennessee and Alabama, and westward to Kansas, and on elevations to the height of 4,200 feet. The roots have a rich spicy taste and odor, resembling anise. The sweet cicely of England (*Myrrhis odorata*), although common about buildings, is an imported plant, probably from central Asia. It is fragrant, and its odor is supposed to be particularly agreeable to bees, therefore hives are rubbed with the herb to attract them.

Cicer, sī'sẹr, a genus of the natural order *Leguminosæ,* of the tribe *Viciæ,* of which the chick-pea (q.v.) is a representative.

Cicero, sĭs'ẹ-rō, **Marcus Tullius,** Roman orator: b. Arpinum 106 B.C.; d. 7 Dec. 43 B.C. His father, who lived in retirement, devoted to literary pursuits, was the friend of the first citizens of the republic. Among this number was the celebrated orator Crassus, who attended to the education of the young Cicero and his brother, Quintus, selected teachers for them, and directed their studies. The perusal of the Greek authors, together with poetry, oratory, and philosophy, occupied the first years of Cicero's youth. He made one campaign under Sulla, in the Marsic war, and after his return availed himself of the instruction of the academician Philo, and of the celebrated orator, Molo, and employed several years in acquiring the knowledge requisite for an orator. He witnessed the barbarities of Marius and Cinna, and the proscriptions of Sulla. Cicero, at that time 26 years old, appeared before the tribunals, at first in civil suits, afterward in a criminal process, in which he defended Sextus Roscius of Ameria, who was accused of parricide by Chrysogonus, a freedman of Sulla. He conducted this defense with courage, confuted the accusers, and obliged the judges to acquit the accused. After this brilliant display he remained a year in Rome, and undertook another suit. But debilitated health obliged him to travel; and he went to Athens, still the centre of science, and here he resided in the house of an academician, was visited by the philosophers of all the schools, and profited by the instruction of the masters of oratory. He also undertook a journey to Asia, and remained some time at Rhodes, where he likewise visited the most distinguished orators, and took part in their exercises. On his return to Rome his displays of eloquence proved the value of his Grecian instruction, and his rivals, Hortensius and L. Aurelius Cotta, were forced to yield to him the palm of oratory. At the age of 30. he engaged in public business, became quæstor of Sicily during the prevalence of a scarcity of food at Rome, and managed to convey a large quantity of corn from thence to the capital, though it was difficult for him so to do without exciting the displeasure of the Sicilians. It was an honorable day for Cicero when the ambassadors from

Sicily appeared before him with the request that he would conduct their suit against their governor, Verres. He showed himself worthy of the confidence of an oppressed people, and appeared against this powerful robber after having himself collected proofs of his crimes in Sicily. He was opposed by the celebrated Hortensius. The crimes of Verres are painted in the liveliest colors in his immortal speeches. Seven are preserved, but only two of them were delivered. After this suit Cicero was elected to the office of ædile (70 B.C.). Though possessed of only a moderate fortune, he managed by well-timed liberality to gain the affections of the people while he held this office, and at the close of 67 B.C., was elected first prætor. But in order to obtain the consulship on which he had now fixed his eyes, it was necessary to obtain the friendship of the great. With this view he joined the party of Pompey, the head of the nobility and the first citizens of Rome, became his panegyrist and most zealous adherent.

Catiline at that time began to plan his conspiracy against the republic. He was accused of extortion in his government of Africa, and Cicero was on the point of undertaking his defense when they became rivals, being both candidates for the consulship. Cicero's merit prevailed over Catiline's intrigues and the envy of his enemies. He was chosen consul unanimously, and entered on his office in 63 B.C. He succeeded in defeating the conspiracy of Catiline (q.v.), after whose fall he received greater honors than had ever before been bestowed on a Roman citizen. He was hailed as the savior of the state, and the father of his country (*parens patriæ*), and thanksgivings in his name were voted to the gods. But Cicero's fortune had now reached the culminating point, and soon was to decline. The conspirators who had been executed had not been sentenced according to law, and Cicero as chief magistrate was responsible for the irregularity. When at the close of his consulship he stood up, according to custom, to render an account of his administration, he was stopped by the tribune, Metellus Celer, on the ground that having put Roman citizens to death without a hearing, he himself was unworthy of being heard. Accordingly he was only able to pronounce the celebrated oath, "I swear that I have saved the republic." Cæsar was always his opponent, and Pompey feared a citizen who loved liberty too much to be favorable to the triumvirs. Cicero saw his credit gradually decreasing, and even his safety threatened. He therefore occupied himself more than ever with science, wrote the history of his consulate in Greek, and composed a Latin poem on the same subject, in three books. At last Clodius, Cicero's enemy, caused a law to be renewed, declaring every one guilty of treason who commanded the execution of a Roman citizen before he had been heard in his own defense. The illustrious ex-consul put on mourning, and appeared, accompanied by the *equites* and many young patricians, demanding the protection of the people. Clodius, at the head of armed adherents, insulted them repeatedly, and ventured even to besiege the senate. Cicero upon this went into voluntary exile, leaving Rome in 58 B.C. Clodius in the meantime procured new decrees, in consequence of which Cicero's country seats were torn down, and a temple of freedom built on the site of his house at Rome. His wife and children were exposed to ill treatment.

The audacity of Clodius, however, became equally insupportable to all, and Pompey encouraged Cicero's friends to have the orator recalled to Rome. The senate declared that it would not attend to any business till the decree which ordered his banishment was revoked. Through the zeal of the consul, Lentulus, and at the proposition of several tribunes, the decree of recall passed the assembly of the people in the following year, and Cicero returned after an absence of 10 months. The assembled senate received him at the gates of the city, and his entry resembled a triumph. But all power at Rome was now in the hands of the triumvirs, Crassus, Pompey, and Cæsar, and for the next few years Cicero was more of an onlooker than an actor, and even submitted to praise and flattery what he disliked and despised. At the age of 54 he entered the college of the augurs. The death of the turbulent Clodius, who was slain by Milo, delivered him from his most dangerous opponent. He defended the perpetrator of this act, who was his friend and avenger, in an eloquent speech; but the presence of Pompey's soldiers, and the tumult of the friends of Clodius, confused him while delivering it. At this period the senate appointed him governor of Cilicia (52 B.C.). Cicero conducted a war while in this office with good success, repulsed the Parthians, and was greeted by the soldiers with the title of imperator. As soon as his term of office had expired he returned to Rome, which was threatened with serious disturbances owing to the rupture between Cæsar and Pompey. Dreading the horrors of a civil war, he endeavored in vain to reconcile the rivals. Cæsar advanced toward Rome, and Pompey was forced to flee with the consuls and the senate. Cicero, not anticipating this sudden approach of Cæsar, was still in Italy. Cæsar saw him at Formiæ, but was not able to gain him over; for although convinced that the party of Cæsar was likely to prevail, and although his son-in-law, Dolabella, was one of Cæsar's confidants, he was prompted by his sense of honor to return to Pompey. After the battle of Pharsalia and the flight of Pompey he refused to take the command of some troops who had remained at Dyrrhachium, but returned to Italy, which was governed by Cæsar's representative, Antony. This return was attended with several unpleasant circumstances, until the conqueror wrote to him, and soon after received him graciously (47 B.C.).

Cicero now devoted himself entirely to literature and philosophy. He was divorced from his wife, Terentia, to enable him to marry Publilia, a beautiful and rich heiress, whose guardian he was; but this union was not happy, and was speedily dissolved. In 45 B.C. the death of his daughter, Tullia, occurred, and affected him very painfully, as he had been devotedly attached to her. The assassination of Cæsar opened a new career to the orator. He hoped to regain great political influence. The conspirators shared with him the honor of an enterprise in which no part had been assigned him; and the less he had contributed to it himself, the more anxious was he to justify the deed, and pursue the advantages which it offered. But Antony took Cæsar's place. Even in this turbulent year Cicero found leisure for literary occu-

pations, and, among other labors, completed his work, 'De Gloria,' which was lost as late as the 14th century. He determined on going to Greece, where he could live in safety; but soon returned to Rome, and composed those admirable orations against Antony, delivered in 43 B.C., known to us by the name of "Philippics," and which are equally distinguished for eloquence and patriotism. His implacable enmity toward Antony induced him to favor young Octavianus, who professed to entertain the most friendly feelings toward him. With him originated all the energetic resolutions of the senate in favor of the war, which the consuls and the young Cæsar were conducting, in the name of the republic, against Antony. Octavianus having possessed himself of the consulate, and formed an alliance with Antony and Lepidus, after the death of the two consuls, the power of the senate and of the orator yielded to the arms of the triumvirs. Cicero was at last convinced that liberty was at an end. At Tusculum, whither he had retired with his brother and nephew, he learned that his name, at Antony's demand, had been added to the list of the proscribed. He went in a state of indecision to the seacoast, and embarked, but contrary winds drove him back to the shore. At the request of his slaves he embarked a second time, but soon returned to await his fate at his country seat near Formiæ. "I will die," exclaimed he, "in my country, which I have more than once saved." His slaves, seeing the neighborhood already disturbed by the soldiers of the triumvirs, endeavored to convey him away in a litter, but soon discovered the murderers at their heels. They prepared for combat; but Cicero, feeling that death was unavoidable, ordered them to make no resistance, bent his head before Popilius, the commander of the murderers, who had once been saved by his eloquence, and suffered death more courageously than he had borne misfortune. He died in his 64th year (43 B.C.). His head and hands were, by the orders of Antony, affixed to the same rostrum from which the orator, as Livy says, had poured forth eloquence unequaled by any human voice.

Cicero's eloquence has always remained a model. After the revival of learning he was the most admired of the ancient writers; and the purity and elegance of his style will always place him in the first rank of Roman classics. The style of his philosophical writings, without oratorical ostentation, breathes the pure Attic elegance which some of his contemporaries wished also to see in his orations. The orator is seen, however, in his prolix and comparatively unanimated dialogues. His philosophical works, the principal part of the contents of which is taken from the Greek, and which combine academic and stoic doctrines and principles, possess very unequal interest for us. Thus, for example, his work, 'De Natura Deorum,' is for us only a collection of errors; the 'Tusculanæ Quæstiones' are full of the subtleties of the Athenian school; his work, 'De Finibus Bonorum et Malorum,' likewise belongs to this somewhat dry dogmatic philosophy. On the other hand, his works on practical morals have maintained their full value. The book, 'De Officiis,' is to this day the finest treatise on virtue inspired by pure human wisdom. The pleasures of friendship and old age have likewise been excellently set forth in 'De Amicitia' and 'De Senectute.' Of his political work 'De Republica,' a considerable part was brought to light by Mai, and published in Rome in 1822. Cicero wrote the six books, 'De Republica,' in his 54th year. In these he endeavored to show by what policy, what resources, and what morals, Rome had obtained the dominion of the world. His 'De Divinatione' and 'De Legibus' are instructive monuments of antiquity. The same philosophical spirit is evident in all his oratorical treatises, particularly in the most important of them, 'De Oratore,' although this contains as little of utility for us as the 'Claris Oratoribus,' 'Topicis,' 'De Partitione Oratoria,' etc. The most interesting of all Cicero's works for posterity are his 'Epistolæ Familiares' and 'Ad Atticum,' which give a more exact and lively idea of the state of the republic than any of his other works, and display most strongly the characteristic traits of the author. See Middleton, 'Life of Cicero' (1741); Forsyth, 'Life of Cicero' (1864); Levin, 'Lectures on the Philosophy of Cicero' (1871); Trollope, 'Life of Cicero' (1880); Nisard, 'Notes sur les lettres de Cicéron' (1882); Gasquy, 'Cicéron jurisconsulte' (1884); Causeret, 'Sur la langue de la rhétorique dans Cicéron' (1886); Davidson, 'Life of Cicero' (1894); Boissier, 'Cicéron et ses amis' (5th ed. 1895).

Cicerone, sĭs-ẹ-rō′nē, one who, in Italy, and particularly in Rome, shows and explains to strangers curiosities and antiquities; hence, in general, a guide. The talkativeness of such attendants procured them the name ciceroni, in jocular allusion to Cicero. This term is falling into disuse, the official designation, servitore di piazza, or simply guida (guide), being used instead.

Cicisbeo, chē-chēs-bā′ō, a name given since the 17th century in Italy to the professed gallant of a married lady. It was the fashion among the higher ranks in Italy for the husband, from the day of marriage, to associate with his wife in his own house only. In society or places of public amusement she was accompanied by the cicisbeo, who even attended at her toilet, to receive her commands for the day. The custom is the more extraordinary, from the natural jealousy of the Italian, who seemed to change his character completely after marriage.

Ciconia, sĭ-kō′nĭ-a, the genus of birds to which belongs the common stork, the type genus of the family *Ciconiidæ*.

Cicuta, sĭ-kū′tạ, a poisonous genus of umbelliferous plants commonly known as water-hemlock or cowbane. The plant is a dangerous poison, said to be fatal to cattle that eat it. Persons are known to have died from eating the root, which is white and fleshy. It may be the *koneion* (hemlock) of the Greeks, which Socrates and other persons condemned to death were required to drink. *C. maculata* is the most dangerous species in America. The genus has no general involucre to the compound umbels, and the partial involucres consist of several awl-like bracts. The common or tree hemlock, *Conium maculatum,* is also a poisonous umbellifer, with a stem from two to four feet high, hollow, striated, and spotted with purple; leaves large, much divided, and fetid when bruised; and with unilateral partial involucres, marks by which

the common hemlock is readily distinguished from the water-hemlock, and from any other species of the *Umbelliferæ*. It is indigenous in most temperate climates, and is extensively used in medicine, being given internally as a sedative, and applied externally to sores, ulcers, etc., in the form of a poultice or ointment. The Latin *cicuta* was the true hemlock. See HEMLOCK; WATER-HEMLOCK.

Cid, El, ăl thĭd or ĕl sĭd, the popular name of a Spanish national hero, Rodrigo (or Ruy) Diaz: b. Bivar about 1040; d. 1099. Legend and tradition have somewhat obscured the character of the historical Cid, but the main facts of his life are well established by Spanish and Arabic records. He first appears in national history when Sancho, the eldest son of Ferdinand I., and king of Castile, was at war with his brother, Alfonso; at this time he was already known as the *Campeadon* (the champion), a name which he won probably by vanquishing in single combat the champion of Sancho of Navarre. In the war with Alfonso Sancho was victorious, and this success was owing to the Cid, to whom he had given the command of his forces. Alfonso was taken prisoner, and it remained only to overcome the obstinate resistance of Zamora, where Sancho's sister, Urraca, ruled. Before the walls of this city Sancho was assassinated, and Alfonso was called to the throne. It is asserted — but the historical evidence here is not complete — that before recognizing Alfonso's authority the Castilian nobles required of him an oath that he had no part in his brother's murder, and that it was the Cid who administered this oath, in 1073. Whatever the facts, Alfonso must have thought it wise to conciliate the good-will of the Castilian grandees until at least his own position became secure, as he gave his cousin Jimena (or Ximena), daughter of the Count of Ovideo, to the Cid in marriage. The marriage contract, dated 1074, is preserved at Burgos. Later the king, taking advantage of a pretext that the Cid had attacked the Moors without obtaining the royal consent, banished him. Old wrongs which the king still remembered probably furnished the real motive. Then began that career of "soldier of fortune," which, idealized by tradition, has made the Cid the perfect cavalier of Spain. He first offered his services to the Christian Count of Barcelona, and, when refused by him, to the Moorish king of Saragossa, who accepted the offer. The Cid remained in Saragossa till 1088, fighting against Moors and Christians alike, and rising to unusual distinction and power. In 1088 the attention of Mostain, the king of Saragossa, was drawn to the city of Valencia, then under the protection of King Alfonso. The Almoravides, a new Moslem sect from northern Africa, defeated Alfonso in battle, and caused him to withdraw his protection from Valencia, and the governor of the city appealed to Saragossa for help. The Cid was sent to the aid of the city in command of an expedition which proved successful, and he established himself in Valencian territory. As the recognized protector of the lawful king, in reality, the suzerain of Valencia, he received a generous tribute; but it is clear that he had already resolved, when opportunity offered, to secure the city for himself. Meanwhile he skilfully held off, now by force, now by ruse, all other competitors, Christian and Moslem alike: including among these King Alfonso, whose territories he once wasted with fire and sword. As head of an independent army, he made successful forays in all directions; despoiling, levying tribute, garrisoning strongholds, and strengthening his position in every way, and in 1094 finally became master of Valencia itself. He successfully held the city till 1099, when the troops he had sent against the Almoravides were utterly routed, few escaping, and he already enfeebled in health, died, it is said, of grief and shame. His widow held Valencia for two years longer.

The Cid very soon became the favorite hero of popular songs. It is probable that these songs were at first short stories in rude metrical form; and that the epic poems, dating from about 1200, used them as sources. The earliest of the epic poems is 'The Poem of My Cid,' based upon history, but with a large amount of legendary matter. Its date is probably about 1200. It is one of the best of mediæval folk epics, its characters being drawn with clearness and simplicity. Another poem of about the same date, 'The Legend or Chronicle of the Youth of Rodrigo,' is of inferior merit, though not without fine passages. Two centuries and more after these poems we meet with the 'Romances' or 'Ballads of the Cid.' The earliest of these do not in their present form far antedate 1500. These ballads are derived from all sources, but chiefly from the Cid legend, which is here treated in a lyric, and popular tone.

These ballads make Jimena (or Ximena) Gomez the wife of the Cid, and tell the legendary story of her father (Don Gomez), insulting the Cid's father, of the Cid's revenge by killing Don Gomez, of Jimena's pursuit of the Cid demanding justice of King Ferdinand, and the final reconciliation through marriage. De Castro, in his drama, 'The Youth of the Cid,' drew his material from the ballads, but added love and the conflict between affection and the claims of honor in the mind of both Jimena and the Cid. Corneille, based his drama, 'The Cid,' upon that of Castro, using the same plot and the same struggle between love and duty on the part of the hero and heroine. Corneille condensed De Castro's 'The Cid,' gave it dramatic unity, and added greater dignity and nobility to the verse. His drama, when first put on the stage in France (1636), met with immediate success.

Ci'der, the expressed juice of apples; a beverage, the quality of which depends principally on the following particulars: Kind of fruit, condition of the fruit when ground, manner of grinding and pressing, method of producing fermentation, and precautions to be taken against its excess.

The Kind of Fruit.— The characteristics of a good cider apple are a red skin, yellow and often tough and fibrous pulp, astringency, dryness, and ripeness at the cider-making season. When the rind and pulp are green, the cider will always be thin, weak, and colorless; and when these are deeply tinged with yellow, it will, however manufactured, or in whatever soil the fruit may have grown, almost always possess color and either strength or richness. The most certain indications of the ripeness of apples are the fragrance of their smell and their spontaneously dropping from the trees. When they are in this

state of maturity on a dry day (all the better if the weather is cool and bracing), the limbs may be slightly shaken and partly disburdened of their golden store; thus taking such apples only as are ripe, and leaving the unripe longer on the trees, that they also may acquire due maturity. They must be carefully gathered to avoid bruising, as mold rapidly fixes upon the edges of every wound of a fruit gathered in autumn, and communicates a disgusting flavor to the juice. The only artificial criterion for ascertaining the quality of an apple for cider is the specific gravity of its must, or unfermented juice; or the weight compared with that of water. This indicates with very considerable accuracy the strength of the future cider. Its weight and consequent value are supposed to be increased in the ratio of the increase of saccharine matter. The strongest and most highly flavored cider which has been obtained from the apple was produced from fruit growing on a shallow loam, on a limestone basis. All the writers on the subject seem to agree that calcareous earth should form a component part of the soil of a cider orchard. A dry and somewhat loose soil is preferred.

Condition of the Fruit.— Fruit should be used when it has attained full maturity, and before it begins to decay. Each kind of apple should be manufactured separately, or at least those kinds only should be mixed which ripen about the same time. The longer the fruit remains on the tree without decay or being injured by frost the better, for not only is the perfect maturity of the juice an important consideration, but the colder the weather, short of actual frost, the more quiet and equable will be the fermentation. When gathered the apples should be carefully stored in some shady, cool room, and placed in heaps to undergo a further ripening, and acquire more saccharine matter while losing a considerable quantity of watery juice.

Grinding, etc.— This operation should be deferred till December, if possible. It is absolutely essential that the weather should be cold, even slightly frosty, to counteract the tendency to rapid fermentation. The apples should be reduced by the mill as nearly as possible to a uniform mass, in which the rind and seeds are scarcely discoverable, and the pomace should be exposed to the air. It has been ascertained that, by exposing the reduced pulp to the operation of the atmosphere for a few hours, the specific gravity of the juice increases from 1.064 to 1.078. For fine cider the fruit should be ground and pressed imperfectly, and the pulp then exposed 24 hours to the air, being spread and once or twice turned, to facilitate the absorption of oxygen; it should be then ground again, and the expressed juice added to it before it is again pressed. The best method of grinding the apples is to employ cylindrical rollers placed so near each other as to crush them. They are fed from a hopper above them, from which the apples pass between a pair of fluted or toothed cylinders, by which they are torn and partially crushed before reaching the more perfectly crushing apparatus below. The mass is then powerfully pressed, and the cider is run into casks.

Fermentation.— The vinous fermentation commences and terminates at different periods, according to the condition and quality of the fruit and the state of the weather. The best thing whereby to judge of the proper moment to draw the liquor from the scum and sediment is the brightness of the liquid which appears after the discharge of fixed air has ceased and a thick crust has collected on the surface. The clear liquor should then be drawn off into another cask. If it remains bright and quiet, nothing more need be done to it till the succeeding spring; but if a scum collects on the surface it must immediately be racked off again, as this would produce bad effects if suffered to sink. Among the precautions used to prevent excessive fermentation is stumming, which is fuming the cask with burning sulphur. This is done by burning a rag impregnated with sulphur in the cask in which the liquid is to be decanted, after it has been partly filled, and rolling it so as to incorporate the liquid with the gas.

Cienfuegos, thē-ān"foo-ā'gōs, **Nicasio Alvarez de,** āl'bä-rēth dā, Spanish poet: b. Madrid 14 Dec. 1764; d. Orthez, France, July 1809. He studied at Salamanca at the time when the modern school of Spanish poetry was founded there by Cadalso and Melendez. He attached himself to this school, and in 1798 laid the foundation of his literary fame by the publication of a collection of poems. Shortly after he became editor of the government newspapers, *La Gaceta* and *El Mercurio,* and was appointed to the department of foreign affairs. He was in possession of this office when the war of Independence broke out. Madrid was occupied by the French, and Cienfuegos, having both offended Murat by an article in *La Gaceta* and taken part in the insurrection of May 1808, was brought to trial and condemned to death. At the intercession of some influential friends the sentence was commuted to banishment to France. His tragedy, 'Pitaco,' had procured his admission to the Spanish Academy. He also wrote the tragedy of 'Idomeneo,' and the comedy of the 'Magnanimous Sisters.' His tragedies are considered his best works.

Cienfuegos, thē-ān"foo-ā'gōs, Cuba, a city in the province of Santa Clara, on the south side of the island. Its harbor, which is one of the finest in the West Indies, was visited by Columbus on his first voyage, and was surveyed by Ocampo in 1508. The town was settled by refugees from Santo Domingo in 1819. Here the revolutionist Narciso Lopez planned to make his first demonstration on 4 July 1847. In recent years its commercial progress has been rapid, and it is now the second seaport of Cuba. Some of the sugar estates in the neighborhood are very large, and conducted on the most approved modern plan; in fact, Cienfuegos is the centre of the sugar trade on the Caribbean coast. It is a city of attractive, well-shaded streets, and substantially built houses. One of its plazas is the largest in Cuba. Among the principal buildings are the governor's house, market, railroad station, and military and government hospitals. Water from the aqueduct is supplied to 42 per cent of the dwellings; from wells, to 47 per cent; from cisterns, to 7 per cent. There are social clubs, a theatre, etc. The city is lighted by gas and electricity. The climate from May to November cannot be highly commended, the air having an excess of moisture, and the temperature ranging from 75° to 98° F. The winter months, however, are very agreeable, winds from the north prevailing, and

the temperature ranging from 60° to 78° F. during the day, with cooler nights. Cienfuegos is connected by rail with Sagua la Grande, on the opposite coast; with Santa Clara, the western terminus of the Cuba Company's main line to Santiago; with Havana, etc. By steamer it is in regular communication with New York, as well as with ports of the southern coast of Cuba from Santiago to Batabano. The population (United States War Department census, 1899) is 30,038. Occupied dwellings number 4,967. Number of inhabitants engaged in trade and transportation, 3,065; in agriculture, fisheries, and mining, 901; in personal service, 4,004; in manufactures and mechanical industries, 3,221; in professional service, 294; without gainful occupation, 18,553. Total school attendance 3,832. Number of persons able to read 18,052, or 60 per cent — a higher percentage in this respect being found among Cuban cities only in Havana (66 per cent) and Puerto Principe (62 per cent). Foreign-born are 11.6 per cent of the city's population. The white people number 19,220; negroes, 3,068; mixed, 7,401; and Chinese, 349. For a time during the Spanish-American war the harbor of Cienfuegos was blockaded by Admiral Schley.

Cieza, thē-ā'thạ, Spain, a town in the province of Murcia, and 24 miles northwest of the city of Murcia, on an eminence near the right bank of the Segura. It has spacious streets, a large church and ancient tower, manufactures of linen and hempen fabrics, and a trade in corn, wine, oil, and silk. Pop. 14,000.

Cigar (of uncertain etymology; it cannot be connected with any West Indian speech, and the derivation at present most common among scholars is from Sp. *cigarra,* cicada, in allusion to a similarity of outline; Sp. *cigarro.* Also incorrectly spelled *Segar),* a compact roll of tobacco, for smoking. This form was borrowed by the Spanish invaders from the Indians of Cuba. When the Spaniards found that tobacco would grow elsewhere, they transplanted it to their possessions in the Philippines and in other localities. The Manila cheroot is the common method of smoking tobacco in the Far East. This cheroot is cut off evenly at both ends and is shorter than American cigars. Rolling tobacco into cigars was not generally practised in Virginia and the Carolinas for a long time after the settlement of those sections by the English, for there the Indians invariably smoked their tobacco in pipes, but finally the convenience and superior flavor these rolls possessed made their use quite common some years before the Declaration of Independence of the American colonies. In Cuba, Mexico, and Central America and, in fact, in all Spanish-speaking countries, the use of a pipe to this day is a rarity, the inevitable *cigarro* or *cigarette* ("little cigar") being found constantly in use.

The moist climate, the character of the soil, and the peculiar preservative qualities of the air make Cuba the true home of the perfect cigar. There are but half a dozen valleys, mostly in the western end of the island, where the finest cigar tobacco is grown and cured, the most important being the Vuelta Abajo district. Perhaps the next best comes from Porto Rico. The removal of the duty on manufactured cigars from that island in 1903 flooded the United States with cigars from there, many of them very inferior. In order to avoid paying the high duties on Cuban-made cigars, the device was early tried of bringing the tobacco over to the small island of Key West, a part of the State of Florida, separated from Cuba by only an 80-mile-wide strait. It was thought that the climatic conditions there would be so similar to those of Cuba that an equally fine cigar could be made there, while the importation of the tobacco in bulk cut down the duties very materially. The "Key West" cigar is much cheaper than the one made in Cuba, but the flavor, for some reason, is inferior. The manufacturers even brought cigarmakers from Cuba to Key West, so that so far as possible the product might be the same as the original, but in vain. It has been discovered by experts of the department that in Ohio and Texas are certain areas which possess a soil so similar to that of the celebrated Vuelta Abajo district of Cuba that it is possible to raise tobacco there that will equal the Cuban. Samples of the leaf grown there and submitted to dealers in New York and Philadelphia, who were not told where it came from, proved to be so similar to that of Cuba that it was pronounced pure Havana leaf of the best quality. The pioneer in the manufacture of Key West cigars was Gen. J. H. Gregory, who gained his military title in the first war for Cuban independence, and was familiar with the internal resources of Cuba.

Tobacco comes to the cigar manufactories in bundles, that intended for wrappers being kept separate. The best tobacco for wrappers is grown in Sumatra. Connecticut wrappers are also much used, being supple and tough. The best cigars made within the limits of the United States are undoubtedly those of Cuban tobacco manufactured in Key West, with a Connecticut wrapper. Those with Virginia, Carolina, Pennsylvania, and other tobaccos as a filler, with the Connecticut wrapper, are of inferior quality, but sell in large quantities, because of their cheapness. The operative spreads the filler leaf on his bench, with a small quantity of the wrapper beside him. He rolls the filler into the proper shape and firmness, then deftly cuts a portion of leaf to form a wrapper, winds the wrapper about the filler, and secures the ends with paste. This is the standard method. Some poorer grades are made by machinery, but the results are not satisfactory and hand-made cigars are still the best and most expensive. Scattered throughout the United States are thousands of large and small factories for the manufacture of cigars, many of them using little machinery. In 1901 there were 6,914,639,012 cigars and 2,728,153,697 cigarettes made in this country. The production of cigarettes has decreased since 1896, when it was 4,967,444,232, the greatest number ever made, and exceeding the number of cigars for that year by over 900,000,000. The reason for this is the persistent fight constantly waged against the cigarette as injurious, most States having stringent laws regulating its sale. The value of this finished cigar product to the makers is probably about $250,000,000 annually, the consumer paying about $750,000,000 for it. This does not include the imported article, about 75,000,000 coming from Cuba (1903) and 125,000,000 from Porto Rico and the Philippines. There are some few thousands

of cigarettes imported from Egypt and Turkey, though most of those called so are made in this country from American tobacco. Altogether the number of cigars and cigarettes made or brought into the United States at present is about 13,000,000,000. For further details, including the preparation of tobacco-leaf, see the article TOBACCO.

Cigarette. See CIGAR.

Cignani, chēn-yä'nē, **Carlo,** Italian painter: b. Bologna 15 May 1628; d. Forli 6 Sept. 1719. He was a pupil of Albano. He knew how to compose, like the Caracci, and to distribute his figures in such a way that his paintings appear larger than they really are. His finest fresco paintings are at St. Michael in Bosco, at Bologna, in ovals supported by angels, and in the saloon of the Farnese Palace, where he represented Francis I. of France touching for the king's evil. In his painting of the Assumption, at Forli, he has imitated the beautiful Michael of Guido in the cupola at Ravenna, and other fine conceptions of this painter; but in other pieces he made Correggio his model. He does not so often introduce foreshortenings as the Lombards; and in his outlines and drapery he possesses a finish peculiar to himself. His pencil is powerful, and his coloring lively. Clement XI. conferred on him several marks of distinction. His paintings have been engraved by various artists.

Cignaroli, Giovanni Bettino, jō-vän'nē bĕt-tē'no chēn-yä-rō'lē, Italian painter: b. Salo, near Verona, 1706; d. Verona 1 Dec. 1770. His best works are in the cathedrals of Pisa, Bergamo, Mantua, and in the churches of his native city and of Ferrara. He educated a numerous school at Verona, and received several invitations to visit foreign courts, which he invariably declined. In style he resembled Carlo Maratti, but formed himself on the works of Guido and Correggio. He was a man of literary culture, and wrote with discrimination and taste on various subjects.

Cilia, sĭl'ĭ-ą (Latin, "eyelashes"), small, generally microscopic, hair-like organs or appendages, averaging $\frac{1}{3000}$ inch in length, found on the surface of the tissues of most animals, and in some vegetable organisms (as algæ), chiefly on tissues which are in contact with water, or which produce fluid secretions. They are constantly in a state of active movement, and communicate to the fluid with which they are in contact a corresponding motion. This is called vibratile or ciliary motion. In most of the lower aquatic animals the respiratory function is aided by means of the vibratile cilia; many animalcules move by a similar mechanism; and in the highest classes of animals cilia have a share in the performance of some important functions.

Ciliata, sĭl-ĭ-ā'tą, a group of *Protozoa,* and to which belong most of the *Infusoria* (q.v.). The body is covered with cilia, and it is either free or stalked and attached to submerged plants, etc. The group comprises the most specialized *Protozoa,* including the trumpet-animalcule (*Stentor*), the bell-animalcules (*Vorticella* and *Epistylis*). In these one-celled animals there is for the first time in the animal kingdom, as we ascend from the simplest organisms, a permanent aperture (cytostome) corresponding to the mouth of the higher animals, and an œsophagus (cytopharynx), and the undigested or waste portions of the food are cast out at a fixed point or opening (cytopyge), usually not detected when not used. There is also in the *stentor,* etc., a definite spiral muscle, while nettling bodies (trichocyst), like minute rods, in rare cases occur, and are supposed to be defensive in their nature. The ciliate infusoria reproduce by fission, budding, and also by conjugation, molting in the origin of spores or embryos. Certain forms are parasitic; thus the skin disease called eczema has been attributed to the presence of parasitic *vorticellæ,* and a flattened oval free form occurs in the large intestines of men ill with diarrhœa.

Cilicia, sĭ-lĭsh'ĭ-a, in ancient geography the region between Pamphylia and Syria, lying south of Mount Taurus. The inhabitants of the coasts were formidable as pirates, and even disturbed the Ægean and Ionian seas. The inhabitants of the northern portion lived in part a nomadic life; those in the east were devoted to agriculture. Alexander made Cilicia a Macedonian province; it then passed to the Syrians. Pompey subdued its piratical inhabitants. The mountainous parts were left in the hands of the native princes; the rest, in 67–6 B.C., was constituted a Roman province, of which Cicero was proconsul in 51–50 B.C.

Cimabue, Giovanni, jō-vän'nē chē-mä-boo'ā, Italian artist: b. Florence 1240; d. there about 1302. Two Greek artists, who were invited to Florence by the senate to paint a chapel in the church of Santa Maria Novella, were his first masters. Although these artists handled the pencil awkwardly, they however taught him, according to ancient tradition, the proportions which the Greek artists had observed in their imitations of the human figure. Attentive to their instructions, Cimabue studied principally the fine antique statues. He was the first to point out to succeeding painters the elements of the *beau ideal,* the memory of which had been extinguished during several centuries of disorder. It is true the paintings of Cimabue do not exhibit that harmonious distribution of light and shade which forms the chiaroscuro. His coloring is dry, flat, and cold; the outlines of his figures intersect each other on a blue, green, or yellow ground, according to the effect which he had in view. He had no idea of linear and aërial perspective. His paintings are, properly speaking, only monochromes. But these faults, which are to be attributed to the infancy of the art, are compensated for by beauties of a high order — a grand style, accurate drawing, natural expression, noble grouping, and a fine disposition of his drapery. His best paintings are in the church of Santa Maria Novello at Florence, and in the Sacro Convento at Assisi. He may be considered the link between the ancient and modern schools of painting. Cimabue evinced a generous appreciation of Giotto, whom tradition says he discovered drawing figures on the smooth surface of a rock while tending his sheep, and whom he took with him to Florence, and instructed with such success that the pupil soon excelled his master. It should be added that there is very little corroborating testimony regarding the works

attributed to him by Vasari, and a recent destructive critic has written in the 'Nineteenth Century' for March 1903, "All, then, that we know about this Cenni di Pepi is that he was a distinguished Florentine artist; that he was nicknamed Cimabue; that he flourished in the closing years of the 13th century and the early years of the 14th, and that he executed a mosaic and an altar-piece at Pisa, of which the latter has disappeared and the former has been entirely renewed."

Cimarosa, Domenico, dō-mā-nē'kō chē mä rō zā, Italian composer: b. Aversa, near Naples, 17 Dec. 1749; d. Venice 11 Jan. 1801. He received his first musical instruction from Sacchini, entered the conservatory of Loretto, where he imbibed the principles of the school of Durante, and studied with great assiduity. He soon displayed his superiority in the 'Sacrificio di Abramo,' the 'Olimpiade,' and other compositions. At the age of 25 he had already gained the applause of the principal theatres of Italy. He was invited to St. Petersburg (where he remained four years) and to several German courts to compose heroic and comic operas. In the latter he particularly distinguished himself by the novelty, warmth, humor, and liveliness of his ideas, and by a thorough acquaintance with stage effects. Among his 120 operas the most celebrated are: 'Penelope'; 'Gli Orazj e Curiazj'; and 'Artaserse,' among the *opere serie;* and among the *opere buffe,* 'L'Italiano in Londra'; 'L'Amor Costante'; 'Il Pittore Cariginо'; and many others. His comic opera, 'Il Matrimonio Segreto,' excited general enthusiasm, and received the signal honor of being performed twice on the same evening, at the desire of the Emperor Leopold. From Vienna he went to Naples, and became involved there in the revolutionary commotions. He died from the effects of the ill treatment which he had been subjected to in prison. His bust, by Canova, was placed in the Pantheon at Rome in 1816 by the side of those of Sacchini and Paesiello.

Cimbri, sĭm'brī, a tribe which inhabited Jutland (the Chersonesus Cimbrica), whence they sallied, together with the Teutones, and became among the most formidable of the enemies of Rome. In the year 114 B.C., when the Romans were already masters of a part of the eastern Alps, in the present Carniola, Istria, etc., and had established themselves in Dalmatia and Illyria, along the coast, immense bodies of barbarians suddenly made their appearance, who overcame the consul Papirius Carbo in the country now called Styria; but instead of entering Italy they proceeded to the north, and soon after, jointly with the Tigurians, entered the territory of the Allobroges. The Romans sent two armies, commanded by the consuls L. Cassius and M. Aurelius Scaurus, to oppose them, but both were defeated — the former by the Tigurians, the latter by the Cimbri. Even after this success the victors did not enter Italy, but overran Gaul with three bodies, consisting of Teutones, Cimbri, and Ambrones. Two new armies, with which the consul C. Manlius and the proconsul Q. Servilius Cæpio hastened to oppose them, were likewise defeated beyond the Rhodanus. The Romans lost, according to Aetius, 80,000 men. While Rome placed her last hope in Marius, the barbarians overran the other western countries of Europe. Gaul suffered severely, but the Iberians and Belgians repulsed the invaders. Upon this they resolved to descend into Italy. The Teutones and Ambrones were to enter on the western side of the Alps, the Cimbri and Tigurians on the east. After Marius had waited the approach of the first during three entire years, and had accustomed his troops to their appearance, he routed them completely (102 B.C.) in two days — on the first day the Ambrones, on the second the Teutones — at Aix in Provence. The Cimbri, on the other hand, who had driven back the consul Catallus on the Adige, and had spread themselves along the Po, demanded land of the Romans, but were totally routed by Marius at Vercelli 101 B.C. About a century after this the Cimbri sent (from the Cimbrian Chersonesus) an embassy to the Roman emperor Augustus, to offer him presents and to ask pardon for what they had previously done against the Romans. The nationality of the Cimbri is a disputed point. Similarity of name led the ancients to identify them with the Cimmerians, but this view is no longer held. Some authorities believe them to have been of Germanic, others of Celtic race. Their name certainly has a great resemblance to that of the Celtic Kymri; and their armor and customs, according to Plutarch and Strabo, were very different from those of the Germans. "All these circumstances," says Schmitz, in Smith's 'Dictionary of Greek and Roman Geography,' "render it in the highest degree probable that the Cimbri were a Celtic or Gallic and not a Germanic nation."

Cim'brian Panic, The, a Roman panic after the annihilation of five armies by the Cimbrians 105 B.C. This panic rose to its climax after the terrible defeat of Cæpio, the consul in Gallia Narbonensis.

Cimburgis Lip, The, often called the "Austrian Lip" (q.v.). It came from Kaiser Maximilian I., and was inherited from his grandmother Cimburgis, a Polish princess, who married Kaiser Friedrich III.

Cimex Lectularius, sī'mĕks lĕc-tū-lār'ę-ŭs. See BEDBUG.

Cimicifuga, sĭ-mĭ-sĭf'ū-ga, from the Latin, "to drive away," so named because certain species are used to drive away bugs and other insects. The plant is a genus of the crow-foot family, comprising about 20 species, natives of North America, Asia, and Europe. The best known American species, because of their medicinal properties are the bugbane (*Cimicifuga americana*) (q.v.) and the black-snakeroot or black cohosh (*C. raceomsa*), supposed to be an antidote for the venom of serpents.

In medicine cimicifuga is used largely by the eclectics as a digestant, cardiac tonic, and uterine stimulant. Its active principles have never been thoroughly determined and little is known of its physiological action as determined by exact pharmacological experiment.

Cimmerian (sĭ-mē-rĭ'an) **Bos'phorus,** an ancient name for the Strait of Kaffa.

Cimmerians, sĭ-mē'rĭ-anz, a tribe half-mythical, half-historical, described first in the Odyssey as dwelling beyond the ocean-stream, in thickest gloom, unvisited by Helios. Hence the term, "Cimmerian gloom." From Herodotus we learn that they originally inhabited the coun-

try between the Borysthenes and the Tanais, but expelled by the Scythians, they traveled along the shores of the Euxine, passed through Colchis and over the Halys, and entered Asia to the west of that river. Against this it is urged that the route by the Euxine would be impassable for a nomadic people, the Caucasus running down to the very shores of that sea. The sum of our certain knowledge respecting this people is, that they seem to have been the chief occupants of the Tauric Chersonesus (the Crimea), where they had a large city, near which were fortifications enclosing the isthmus by an earthen wall.

Cimolian (sĭ-mō'lĭ-ăn) **Earth,** or **Cimolite,** sĭm'ō-līt or kĭm'ō-līt (from Kimolos, one of the Cyclades, in the Ægean Sea, where it is still to be found), a hydrated silicate of aluminum, apparently formed by the decomposition of augite. It is of a light color, compact, and somewhat slaty. Water soon splits it up; when ground with water it forms a thick cream. In classical times it was used as a soap for cleaning delicate fabrics, and by the bath-keepers. It is mentioned by Aristophanes in this connection. It is used in the island as a detergent.

Cimon, Athenian general and statesman: b. about 502 B.C.; d. Citium, Cyprus, 449 B.C. He was a son of the great Miltiades. He fought against the Persians in the battle of Salamis 480 B.C., and shared with Aristides the chief command of the fleet sent to Asia to deliver the Greek colonies from the Persian yoke. The return of Aristides to Athens soon after left Cimon at the head of the whole naval force of Greece. He conquered the pirate-island of Scyros, subdued all the cities on the coast of Asia Minor, pursued the Persian fleet up the Eurymedon, destroyed more than 200 of their ships, and then, having landed, on the same day entirely defeated their army 469 B.C. He employed the spoil which he had taken in the embellishment of Athens, and in 463 reduced the revolted Thasians; but the popular leaders, beginning to fear his power, charged him on his return with having been corrupted by the king of Macedon. The charge was dropped, but when Cimon's policy of friendship to the Lacedæmonians ended in the latter insulting the troops sent by Athens to their aid, his opponents secured his banishment. He retired into Bœotia, and his request to be allowed to fight with the Athenians against the Lacedæmonians in 457 at Tanagra was refused by the suspicious generals. Eventually Cimon was recalled at the instance of Pericles to conclude a peace with Lacedæmon. He died while besieging Citium in Cyprus.

Cinapusen, sē-nä-poo'sän, or **Cinapuran Islands,** a cluster of 10 islands of the Tawi group, Sulu Archipelago, lying southwest of the island of Sulu; area 13 square miles. The islands are covered with tropical vegetation, and are mostly resorted to for fishing by natives of neighboring islands. Tabawan, the largest of the cluster is, however, thickly populated; the inhabitants carry on a considerable pearl fishery. They were at one time notorious pirates, but since the destruction of their settlements by a Spanish fleet, have been harmless and inoffensive. The islands now belong to the United States and are a part of the Military Department of Mindanao.

Cinchona Bark, the bark of several species of *Cinchonaceæ* (q.v.). The following are the most important: *Chinchona flava cortex,* yellow cinchona bark, which occurs as quills covered with a brown epidermis, mottled with whitish yellow lichens, and also in flat cinnamon-colored pieces. They break with a fibrous fracture and the escape of a powder. Yellow bark is rich in quinine, and 100 grains should yield not less than two grains of alkaloid. It is derived from *C. calisaya,* which grows in the peculiar cloudy regions of the Andes. *C. pallidæ cortex,* pale cinchona bark, from *C. condaminea.* It occurs always in quills covered with crustaceous lichens. Its fracture is short and not fibrous. It contains chiefly cinchonine. Two hundred grains of the bark yield about one grain of alkaloid. *C. succirubra* appears to thrive in India. The bark occurs in flattened rough-fibrous, dark-brown red pieces, which are covered with a brown-red epidermis. It breaks with a red fibrous fracture. It contains about equal quantities of cinchonine and quinine, and 100 grains of the powdered bark should yield not less than 1½ grains of alkaloid. The yellow bark is used in the form of decoction, extract, infusion, and tincture. The pale bark is contained in *tinctura cinchonæ composita* and in *mixtura ferri aromatica.* The cinchona barks contain, besides the alkaloids, certain acids having astringent properties, and are valuable as tonics in cases of great debility. Cinchona barks rich in quinine generally contain much lime, and their solutions are precipitated by sodium sulphate. See QUININE.

Cinchonaceæ, sĭn-kō-nā'sē-ē, a well-marked order of plants, almost exclusively found within the tropics. Its leaves are simple, entire, opposite, with interpetiolary stipules. The flowers are usually arranged in panicles or corymbs. The calyx is adherent, with a definite number of divisions or none. The corolla is superior, tubular, and regular, with a definite number of divisions. The stamens arise from the corolla, all on the same line, and alternate with its segments. The ovary is inferior, surmounted by a disk, usually two-celled, occasionally with several cells; the style is single, inserted, sometimes partly divided; the stigma usually simple, sometimes divided into a number of parts. The fruit is inferior, dividing into halves, or not dividing, and dry or succulent; sometimes it is many-celled. Many of the species of this order are of considerable importance, being largely used in medicine, acting as tonics, febrifuges, emetics, and purgatives. The species of *Chinchona* yield Peruvian bark. An extract, with some sweetness and a more astringent taste than terra japonica, and called by the Malays gambier, is obtained from the *Uncaria gambir.* Ipecacuanha is the root of *Cephäelis ipecacuanha,* a little, creeping-rooted, semi-herbaceous plant, found in the damp forests of Brazil. Coffee is the seeds of a plant of this order, the *Caffea arabica.* A few species bear an edible fruit, such as the genipap of South America, the nahil peach of Sierra Leone, and the voa-vanga, a good dessert fruit in Madagascar. Among dyeing plants there is the

Oldenlandia umbellata, whose roots are the chay-root (q.v.) of commerce.

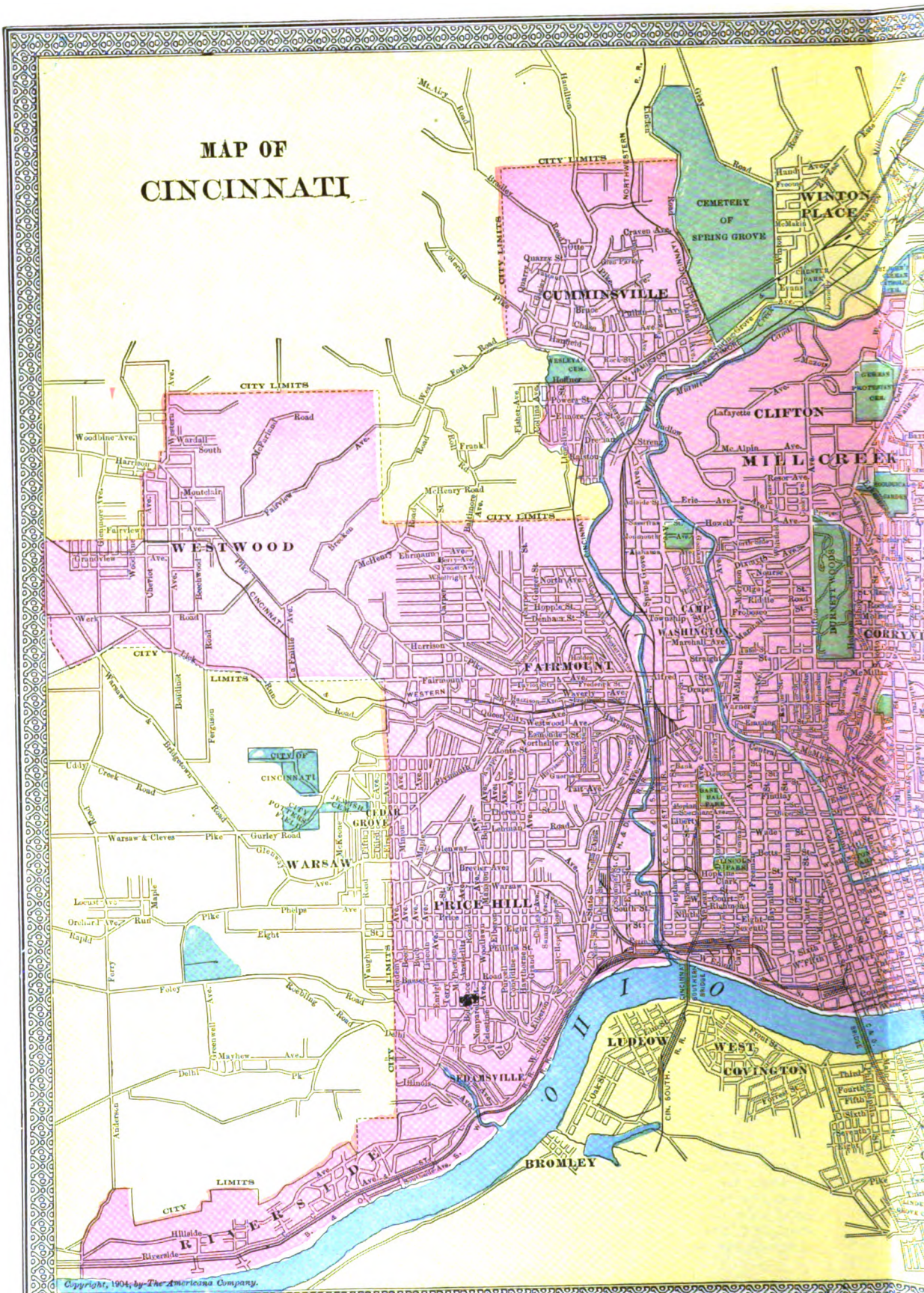
Cincinnati, Ohio, county-seat of Hamilton County, in the extreme southwest of the State, one of the great commercial and manufacturing centres of the Union, tenth in nominal rank, and seventh or eighth in fact. It is situated on the north bank of the Ohio River, almost exactly half way from its origin at Pittsburg to its mouth at Cairo, Ill., about 465 miles by water from each and 315 by rail from the former, and 369 from the latter; and is a station on every trunk line of railroad in the Middle West, being the main terminal of the Cincinnati Southern, Cincinnati, Hamilton & Dayton, Chesapeake & Ohio, and a number of others. It is 138 miles by water from Louisville, and 1,631 from New Orleans, against 114 miles and 1,210, respectively, by rail; 764 miles by rail from New York, and 270 miles from Chicago.

Topography.— Cincinnati occupies the northern half of a circular amphitheatre of hills about two and a half miles in diameter, bisected east and west by the Ohio River — which here makes a great southward sweep. In the southern half, bisected north and south by the Licking, lie its Kentucky suburbs, respectable cities themselves. The northern semicircle rises from the river in two great terraces, sloping northward to a third level at the summit; originally quite distinct, now much confused by grading. The lower platform is a bluff about 65 feet above low water, the second 50 to 100 feet higher, the crest-hills 150 to 300 feet higher yet, or about 475 feet at the summits — Mount Adams, Mount Lookout, Mount Auburn, Fairview Heights, etc.— giving a noble prospect of river and country. Four of these hills can be reached by inclined plane cable railways used in the main for the lifting of the electric cars. They are cut by ravines, and much of the heavy original woods has been left intact, while the remaining ground has been occupied by miles of the finest residence streets in America, parked with shrubbery, lawns, and flower gardens. On the western side of the city from north to south runs Mill Creek, the remains of a once huge glacial stream, whose gently sloping valley half a mile or more wide, forms an easy path into the heart of the city, and was an indispensable factor in determining its position; highways, canals, and railroads come through it, and the city's growth has pushed much farther up this valley than in other directions. The railroad stock yards are on its eastern slope. Cincinnati extends for about 14 miles along the river front, to a width of about five in an irregular block north from it, but attains a width of six or seven miles at the extreme point along the creek valley. The total area thus far in the city limits is 42½ square miles; much more is legitimately a part of it.

Municipal Conditions.— The site of the city is a glacial moraine of gravel and boulders, cut through by the Ohio; there is therefore little bottom land, and has been from the first little of the malaria which was long such a scourge and reproach to western settlements; and this, with the moderate climate, averaging about 75° in summer and 34° in winter, and the easy sewerage down the slopes into the Ohio and away from the city, has given it excellent sanitary conditions, its death-rate falling from 21 per 1,000 in 1890 to 19 in 1900, and 18 at present. The city owns its own waterworks and 449 miles of mains. The water is pumped from the Ohio River into reservoirs in Eden and Third Street Parks, having a capacity of 106,000,000 gallons, the daily consumption being about 44,000,000 gallons. The system is now being extended at an approximate cost of $10,000,000, and will when completed draw its supply from the Kentucky side of the Ohio opposite California about eight miles up the river and beyond all contaminating sources. The extension includes a complete mechanical filtration plant at the new reservoirs, which will have a capacity of 350,000,000 gallons. With the completion of the new waterworks perfectly pure water will be delivered direct to the consumer. The city has 641 miles of streets, of which 391 miles are paved with macadam, granite, asphalt, etc.

Interior, Suburbs, etc.— The bottom level below the bluffs, along the riverside, is of course the seat of the river shipping business, and has as well the usual fringe of low quarters; it is paved and there is a broad "public landing" fronted by floating docks, wharf-boats, etc. Above are the wholesale and then the retail business streets, with great extent and variety of fine business architecture, and gridironed with electric roads, of which there are some 225 miles within the city limits. The principal lines converge at or near Fountain Square (see below), and connect with a ring of beautiful suburbs, within and without the city limits, unsurpassed in America. To the north are Clifton, Avondale, Mount Auburn, Vernonville, College Hill, Winton Place, Linwood, Elmwood, Hartwell, Lockland, Glendale, Norwood, Oakley, Walnut Hills, Mount Lookout, etc.; across the river, over which, on three bridges, the electric lines run, are numerous cities and towns, including Covington, Ludlow, and Milldale to the west of the Licking, and Newport, Bellevue, Dayton, and, far beyond, to the east, Fort Thomas, a leading army post. The section lying to the north and east of the canal which intersects the plateau at the foot of the suburban hills is largely occupied by Germans, from which circumstance it is frequently referred to as "over the Rhine." The river is crossed by five bridges, each more than half a mile long, one exclusively for railway traffic, two for highway, and two for both; the truss-bridge of the Cincinnati Southern to Ludlow — costing $3,348,675, with one of the longest spans in the world — the cantilever of the Chesapeake & Ohio to West Covington; the great wire suspension bridge to Covington, designed by John A. Roebling, and completed in 1867 at a cost of $1,800,000, and two wrought-iron bridges to Newport, one of them used by the Louisville & Nashville R.R.

The original town was laid out as a checkerboard, with streets four rods wide, the conventional form of the artificial American town; but the irregular surface and individual tastes have given them greater variety since, and no city has a finer field for picturesque architecture. The older residence streets were monotonous rows of low brick houses, but the newer ones have a remarkable variety both of form and material. A local freestone and blue limestone are much used in building, as well as brick with steel framing. The most notable public buildings, besides churches mentioned below, are the gov-



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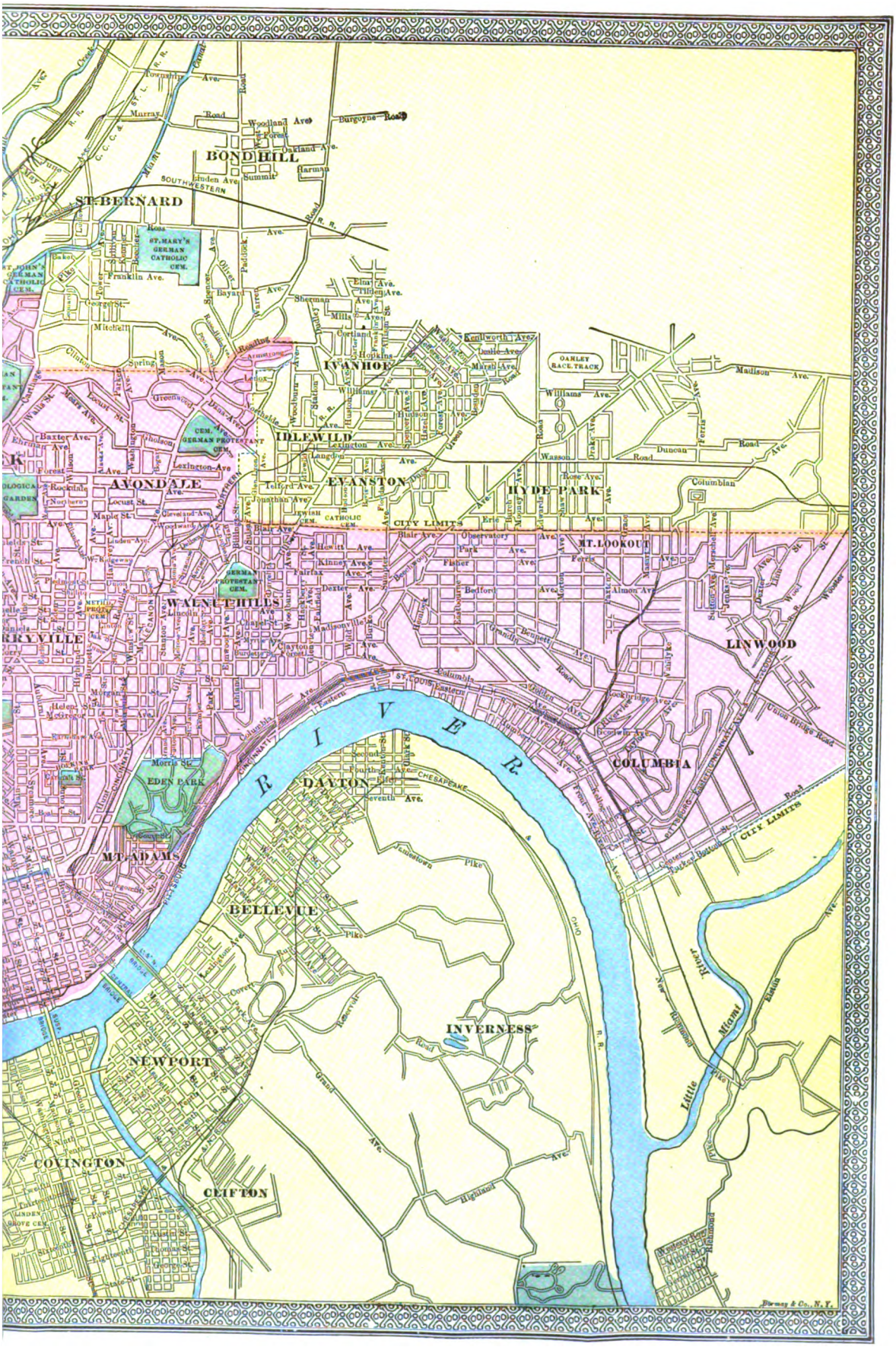

BOND HILL
ST. BERNARD
IVANHOE
IDLEWILD
EVANSTON
AVONDALE
HYDE PARK
MT. LOOKOUT
WALNUT HILLS
LINWOOD
COLUMBIA
DAYTON
MT. ADAMS
BELLEVUE
INVERNESS
NEWPORT
COVINGTON
CLIFTON
CITY LIMITS
R I V E R
OAKLEY RACE TRACK
EDEN PARK
Burgoyne Road
Madison Ave.
Columbian
Union Bridge Road
Jamestown Pike
Little Miami
Highland Ave.
Grand Ave.
Richmond
Observatory Ave.
Bedford Ave.
Almon Ave.
Fisher Ave.
Park Ave.
Ferris Ave.
Kinney Ave.
Howell Ave.
Fairfax Ave.
Dexter Ave.
Madisonville
Wildwood Ave.
Clayton
Forest Ave.
Blair Ave.
Erie
Duncan Road
Williams Ave.
Kenilworth Ave.
Double Ave.
Mitchell Ave.
Franklin Ave.
Woodland Ave.
Oakland Ave.
Linden Ave.
Summit
Harman
Township Ave.
Murray Road
Ross
Baker
Pike
George St.
Sherman
Mills Ave.
Cortland
Hopkins
Lexington Ave.
Langdon Ave.
Telford Ave.
Jonathan Ave.
Locust St.
Maple St.
Rockdale
Lexington Ave
Baxter Ave.
Forest Ave.
Greenwood
Dana Ave.
Mound St.
Spring
Mitchell Ave.
Clinton
Carlisle
Wall St.
Main St.
Eastern Ave.
Columbia Ave.
Morris St.
Pavilion St.
Linden Ave.
Lincoln Ave.
Maryland
Hamilton
Bedford
Bennett
Rockridge Ave.
Observatory Ave.
Ferris
Almon Ave.
Fisher Ave.
Park Ave.
Dexter Ave.
Fairfax Ave.
Kinney Ave.
Howell

ernment building (post-office, custom-house, etc.) of brick and iron with sawed freestone facing, 180 feet by 50, and costing $5,200,000; the county court-house (Romanesque), replacing the one destroyed by the mob in 1884, with the jail in the rear, the whole occupying an entire square; the beautiful city-hall, completed in 1893 at a cost of $1,266,956.10; the city hospital, of eight buildings around a central court, occupying a square of nearly four acres, and costing over $700,000 exclusive of grounds; the city workhouse, the university buildings, the Chamber of Commerce, one of H. H. Richardson's last designs; the magnificent Music Hall, the gift of Reuben R. Springer and others; the Romanesque public library, costing $675,000; the Masonic Temple (Byzantine), Odd Fellows' Temple, Y. M. C. A. Building, Art Museum, the Queen City, Cincinnati and Phœnix clubs, Lafayette and Third National Bank buildings, Rookwood Pottery, St. Francis Xavier's College, a splendid structure; the Central Union depot, the city markets, and the sky-scrapers of 15 to 20 stories, one of which, the Ingalls Building, is the tallest concrete structure in the world, as well as smaller but admirable bank and other business buildings. Of public monuments, by far the most artistic is the Tyler-Davidson Fountain, with a surrounding esplanade, on Fifth Street, between Vine and Walnut, in Fountain Square, the centre of most of the street car lines. It was presented to the city by Henry Probasco in 1871, having been cast at the Royal Foundry in Munich at a cost of $200,000, and is regarded as the finest fountain in the world, and one of the world's chief art treasures. The equestrian statue of President William Henry Harrison (first governor of Ohio), the statues of Garfield, Lincoln, Hecker and McCook, and the Fort Washington monument also adorn the city.

Parks, Cemeteries, etc.— The park system comprises 540 acres, in three large bodies on the hills and seven smaller ones. The largest is the superb Eden Park, containing 210 acres, on Mount Adams in the northeast centre, containing the two main city reservoirs made to look like lovely natural lakes; there is also a high water tower with steps to the top, commanding a matchless prospect. The Art Museum and Art School, the gift of C. W. West, Joseph Longworth, David Sinton, R. R. Springer, and others, two beautiful buildings costing $450,000, is within the grounds, which are entered by a mediæval gateway, Elsinore, much admired. The next largest park, and equally picturesque, is Burnet Woods in the north centre, with about 160 acres; it contains the grounds, 30 acres in extent, of the University of Cincinnati (q.v.), and another exquisite lake. The zoological gardens, northeast of Burnet Woods, with 60 acres of wild natural beauty, is the home of a varied collection of wild animals and birds, regarded as the best in the country. Lincoln, Washington, and Hopkins are the finest of the smaller parks. Most of the 20 cemeteries are in the northeast, though one or two are in the extreme southwest; but the one superb burial ground, one of the largest and most charming in the country, is Spring Grove Cemetery, about six miles north on the western slope of Mill Creek Valley, with 600 acres of fine landscape gardening and native beauty, and reached by an avenue 100 feet wide. It has a bronze statue as a soldiers' monument, and a number of magnificent and costly mausoleums.

Amusements, Clubs, etc.— Cincinnati's large German population, with the healthy taste of that element both for recreation and music, has given it a foremost place in these lines. Music is cultivated in a number of well patronized institutions, the College of Music and the various conservatories, and the biennial May festivals are an indispensable part of the city's higher life and are known throughout the world. Other important features of the musical life are the permanent symphony orchestra, the Apollo and Orpheus clubs and a large number of German singing societies. The grand Music Hall is a monument of the munificence of Reuben Springer, who founded it and gave part of its endowment; it is 500 feet by 300, has a seating capacity of over 4,000, and its organ is one of the largest in the country. There are also the Grand, Robinson's, and Heuck's Opera houses; the Walnut Street, Columbia, Lyceum, and People's theatres, the Auditorium, College and Greenwood halls, the Turner and Arbeiter halls, etc. The chief clubs are the Queen City, Business Men's, Phœnix, Cincinnati, Cuvier, Country, Commercial, and Literary. The Cincinnati Gymnasium has extensive suburban athletic grounds and owns a fine city building. There are two favorite summer resorts on the Ohio, one on the Kentucky shore called the Lagoon, and Coney Island, some miles up the river. Chester Park, near Spring Grove Cemetery, is also a well-equipped resort.

Business Interests.— The position of Cincinnati as a midway port on the great central channel of one of the most fertile districts of the world, added to its location on a platform above the floods which washed away its rivals, was the origin of its greatness; but that river traffic has greatly declined since the advent of railroads. Even yet, however, it is invaluable for the transportation of bulky freight — coal, ore, iron, lumber, salt, etc.— to manufactories, and the distribution of its products to the Ohio and Mississippi and their tributaries. A number of regular packet lines still run to Louisville and the Mississippi ports as far as New Orleans, up the Ohio to Pittsburg, to the Big Sandy, Cumberland, Tennessee, and Green, the Red, White, Arkansas, Yazoo, etc., covering 1,200 miles of the Ohio, 850 of the Mississippi, and 2,000 of tributaries. About 100 vessels a year register for this inland commerce, with a tonnage of some 18,000; but there is a much greater commerce than this indicates, as one towboat will push many barges in front of it, a method peculiar to western rivers. The government improvements, dredging and lighting the channel, have greatly aided to keep this navigation alive. Furthermore, by the Miami Canal to Lake Erie at Toledo, much heavy raw material is still brought in at rates the railroads cannot meet. The immense railroad business has already been referred to. Sixteen roads enter Cincinnati; the passengers of most of them come into the Central Union Depot at Central Avenue and Third Street; but a few, of which the Pennsylvania, and Cincinnati, Hamilton & Dayton are chief, have separate stations. The Cincinnati Southern road, 338 miles long, was built and is still owned by the city, and is operated by the Queen & Crescent route under lease.

The trade and manufacturing interests of the city are enormous, even beyond the proportion of its size. It has 13 national banks, clearings aggregated $1,154,647,600 for 1903. It has also a number of State and private banks. The building and loan associations, which had grown to number 309 in 1902, are being largely absorbed by new and strong trust companies and savings banks. The slaughtering and packing of meats, especially pork, has long been and is still one of the leading branches of commerce, the city packing more than half the meat product of the State. Cincinnati holds the first position in this country in sales of pig-iron, the total yearly receipts and sales for direct shipment amounting annually to nearly $50,000,000. The number of industrial establishments is about 8,000, employing a capital of about $135,000,000, and 110,000 workmen, and occupying real estate valued at $65,000,000, with an annual product of $315,000,000. The value of commodities received (latest estimate of Chamber of Commerce) was $545,000,000, while the value of the principal commodities shipped was $505,061,615. According to the census of 1900, the greatest single branch is iron work, including pig, castings, foundry and machine-shop products, and architectural iron work, $12,384,848; others, men's clothing (factory-made), $11,950,648; slaughtering and meat packing, wholesale, $9,532,057; distilled liquors, $9,419,687; factory-made boots and shoes, $8,788,424; carriages and wagons, and their material, $7,233,048; tobacco products, $6,768,467; malt liquors, $6,387,383. Other great products are leather and leather goods; furniture, lumber, timber, and woodworking products; coffee and spices, roasted and ground; saddlery and harness; pickles and preserves; undertakers' goods; musical instruments; soap and candles; electrical supplies; flour and grist; plumbers' supplies; patent medicines; and society regalia, costumes, banners, etc., in which Cincinnati heads the United States. Other products number hundreds, many curious and interesting.

Educational Institutions, Libraries, Newspapers, etc.— Cincinnati has a thorough system of public schools, with 52 grammar schools (including one for deaf-mutes), and three public high schools, the Hughes, Walnut Hills, and Woodward; with about 850 teachers; and 15 private academies and secondary schools, besides several score of Catholic parochial schools. For higher education, the chief is the University of Cincinnati, expanded from the old McMicken University, the capstone of the system of public instruction, with affiliated law, medical, and dental departments, and in connection the famous observatory now located on Mount Lookout — one of the earliest in the United States, with an 11-inch refractor and a new meridian circle, and with a notable record in the investigation of double stars. The university buildings are in a 30-acre space set off by the city in Burnet Woods Park. The Ohio Mechanics' Institute, one of the most important educational forces in the city, has a large, thoroughly equipped building and library, and maintains both day and night schools, attended by hundreds, in which regular classical, literary, and scientific instruction and courses of lectures are given. There are also half a dozen medical and surgical schools, besides training schools for nurses in the hospitals; two other dental colleges; a night law school; several business colleges and schools of expression; Lane Theological Seminary at Walnut Hills (1832), famous for Lyman Beecher and Calvin E. Stowe, and for its slavery dissensions; two Roman Catholic colleges, St. Francis Xavier (1840), and St. Joseph's (1873); 5 Catholic seminaries for the education of priests, and 6 Catholic female academies and seminaries, leading to orders; the Hebrew Union College for educating rabbis, the chief one in the United States; the Art Museum and Art School founded by Cincinnati ladies on the model of South Kensington, with two large buildings and several hundred students, and a valuable collection of works of art. The Cincinnati Society of Natural History has a museum of valuable and interesting relics open to the public. Of the libraries, the chief is the free Public Library, handsomely housed on Vine Street (with over 300,000 volumes and pamphlets), and various suburban branches. There are 16 others, subscription and institutional, of which the chief are the Young Men's Mercantile, the Law Library, that of the Mechanics' Institute, the library of St. Xavier's College, Lloyd Library and Museum, the University Library, and the Historical and Philosophical Society has the finest collection in existence of original manuscripts, pamphlets, and bound volumes, pertaining to the history of Cincinnati and the State of Ohio, and ranks among the first institutions of the kind in the country. There are in 1904, 19 daily newspapers, 12 English, 6 German, and one Italian; 70 English and 13 German weeklies; 79 monthlies, 23 quarterlies, and 14 of various other kinds, 229 periodicals in all.

Churches and Charities.— Cincinnati in 1903 had 269 church bodies, 60 Roman Catholic (besides five convents), 180 Protestant of various denominations, 12 Jewish synagogues, and 17 unclassified, including Christian Science, Spiritualist, etc. The city is the seat of a Roman Catholic archbishop and a Protestant Episcopal bishop, with cathedrals of both. The finest church building in Cincinnati is the cathedral of the former (St. Peter's), in pure Grecian style, 180 feet by 60 and 90, with a spire 224 feet high. Other prominent churches are the First Presbyterian, with a tower and spire 285 feet high, the loftiest in the West, surmounted by a gilt hand pointing upward; the Second Presbyterian; St. Francis Xavier and the St. Francis de Sales (Roman Catholic) on Walnut Hills (with the largest swinging bell in the world); the Hebrew Synagogue and the Temple; Christ's and St. Paul's Protestant Episcopal, and St. Paul's Methodist Episcopal; the Ninth Street Baptist; the Unitarian; and the Church of the New Jerusalem (Swedenborgian).

There are 53 benevolent associations in the city, covering every class and grade of alleviable human misfortune; an infirmary; a house of refuge for irreclaimable children; and a workhouse, with workshops and work grounds. Prominent among the 17 hospitals, public and private, are the large city hospital, the Jewish Hospital, Good Samaritan, St. Mary's (both Catholic), Longview Asylum, United States Marine, Bethesda, the Ohio Hospital for Women and Children, the Presbyterian, the Elizabeth Gamble Deaconess Home and Christ Hospital, and the Laura McDonald Memorial. There are also numerous homes for the aged and infirm, for

orphans, for incurables, and the friendless, non-sectarian, and denominational, all splendidly equipped, and a fresh-air fund and farm.

Government, Finances, etc.— The government is "federal"; there is a two-years' mayor, who appoints non-partisan election, supervisory, and public safety boards (in control of the fire and police departments); a (legislative) council of one from each ward; other boards and officers elected by the people, including an administrative board of public service, and a board of education. The city debt is about $25,000,000, but $18,000,000 of this is for the Cincinnati Southern line, which returns $1,000,000 a year rental. The tax-rate is $22.70 per $1,000. The yearly disbursements are about $7,000,000, of which over $1,000,000 is for schools.

Population.— In 1800, 750; 1810, 2,540; 1820, 9,642; 1830, 24,831; 1840, 46,338; 1850, 115,435; 1860, 161,044; 1870, 216,239; 1880, 255,139; 1890, 296,908; 1900, 325,902. The census bureau estimate for 1904 is 332,934, which obviously does not include the territory annexed to the city in March 1904. This does not convey accurate information, however, without supplemental figures based on the position of the city with nearly a third of its business population resident across the river in another State, as well as several populous suburbs in other townships to the north. Newport, Bellevue, and Dayton, Ky., east of the Licking, contained in 1900 40,761; Covington and Ludlow, west of it, 49,989, or 90,750 in Kentucky; while Mill Creek and Columbia on the north had 34,629 — a grand total of 451,281.

History.— The site of Cincinnati at the time it first came under the eye of the white man was covered with "ancient works," monuments of a prehistoric race. Traces of many of these "works" still abound in the neighborhood, which is a centre of the so-called "Mound Builders'" remains. Here, too, ran the old Indian trail leading from the British trading post at Detroit to the Licking River, and into the section south of the Ohio. Numerous bands of savages swept through the valley of the Miamis, subsequently called the "Miami Slaughter House," on their marauding expeditions against the Kentucky pioneers. It was in pursuing one of these bands of "horse thieves" that Benjamin Stites first noticed the fertility of the section and its desirability for settlement. As a result of his efforts came the "Miami Purchase."

John Cleves Symmes, with other members of Congress who had been interested by Stites, in 1787 began negotiations with the government for the land lying between the Miamis, which resulted in a conditional purchase that on survey proved to be some 600,000 acres, of which he ultimately received about half. Early in 1788 he sold 740 acres opposite the mouth of the Licking to Matthias Denman and others, with whom he visited the spot later and selected it as the site for a city, to be called Losantiville — a combination of Latin and French, meaning "town opposite the mouth of the Licking." After some shiftings of ownership, a firm consisting of Israel Ludlow, a surveyor, and two others, took possession 28 Dec. 1788, and Ludlow laid out a village with the present Central Avenue and Broadway, about three quarters of a mile apart, for east and west boundaries, and Seventh Street, about as far from the river, for northern, blazing the street lines on the trees. Three or four log-cabins were built, and the flooding out of several Ohio River town sites about this time left Cincinnati the chief survivor. The building of Fort Washington by the government in the summer of 1789, just east of Broadway, still further confirmed its primacy, for the Indians were a terrible menace until long after. In January 1790, General Arthur St. Clair, newly appointed governor of Northwest Territory, arrived, laid out Hamilton County (named after Alexander Hamilton), and made its seat the new town, whose name he changed to Cincinnati (Symmes, who professes to have suggested the change, was tenacious for Cincinnata), after the famous society of Revolutionary officers, of which he was a member. By the end of 1790, it had some 40 log-houses. The defeats of Harmar (1790) and St. Clair (1791) nearly caused its abandonment in a panic, but the importance of the fort kept the settlement alive. In 1792 as many as 354 lots had been taken for building; and so important a centre of commerce had it become even then that 34 of its buildings were warehouses well stocked with goods. It had some 900 inhabitants, but many of them were floaters. A visiting missionary reported that the people resembled those of Sodom, and the town, like others on the north bank of the Ohio, was thronged with frontier idlers and lawless ruffians who took refuge in Kentucky when brought to book; but as the first church (Presbyterian) was built this year, and the first school (pay) opened with 30 scholars, perhaps some of this language was "common form." Also as settlers were compelled by law to take their loaded guns to church for protection against Indians, it was no place for the tamer sort. In 1793, the 'Centinel of the Northwest Territory,' the first newspaper published north of the Ohio, appeared, and a year later the first through mail to Pittsburg was started in a canoe, and a packet line of keel boats to Pittsburg was organized. Wayne's crushing defeat of the savages at Fallen Timbers, bringing peace to the frontier, was in one sense disastrous to Fort Washington, as settlers swarmed all over Ohio, and it ceased to be the one centre. This defeat, however, assured the permanency of Cincinnati, which increased slowly but surely until in 1800 its population was 750, a growth of 50 per cent since 1795. In December 1801 the seat of territorial government was removed to Chillicothe. But its 12 years' primacy, the army post making it a depot for supplies, and its frontier position, had given it a safe start. In 1802 Cincinnati was incorporated as a town. A well-known picture of the town also dates from this year, in which, too, a "Young Ladies' School" was started, indicating a superior grade of population; and from February to May 1802 over 4,400 barrels of flour were exported, showing its development as a distributing port. The first bank, that of the Miami Exporting Company, was started in 1803. In 1805 the town had 960 people and 172 buildings. But immigration set in much more strongly a year later, and the names show an extraordinary intellectual calibre in the settlers it was attracting. In 1810 it had 2,300 inhabitants, and was the largest town in the State, the centre of immigration to Ohio, and with a great commerce along the river, and was contemplating a university. The first book de-

scriptive of the place appeared this year written by the celebrated Dr. Drake. In October 1811 the New Orleans (steamboat) passed the town on her first trip from Pittsburg to Louisville. A stone steam mill 110 feet high of nine stories and with foundation walls 10 feet thick, dates from 1812. In 1814 Lancaster Academy, afterward Cincinnati College, was founded. In 1819 the town received a city charter, having according to the first directory, published this year, 9,873 inhabitants, mostly from the Northern and Middle States, but also many foreigners, so that it was "not uncommon to hear three or four languages spoken in the streets." Another little book descriptive of the city published in 1826 was republished in England and, translated into German, circulated on the continent and attracted a large number of immigrants, especially Germans, who by 1840 numbered one fourth of the population. But its great development came with the opening of the Miami Canal, the most important single influence in the history of the city, for which ground was broken in 1825 at Middletown, and which was completed to Cincinnati in 1827. This not only developed commerce, but furnished great waterpower for manufacturing. The first railroad, the Little Miami, was chartered in 1836, but was not opened till 1846, the first section not till 1843. Even before this the growth was very rapid, population nearly trebling 1820–30, and nearly doubling 1830–40; but the next decade showed the tremendous leap from 46,000 to 115,000. From 1840 the immense immigration of Germans increased so rapidly as to make it for years the typical German city, and this element still constitutes a large proportion of the population. The Germans took great interest in grape culture, and "the banks of the beautiful river" were festooned with vines and the city for some years was a great wine market. It was the great German population that caused the first Saengerfest of the North American Saengerbund to be held here in 1849, a great stimulus to the musical activity of a city since so famed in the musical world. Several times the city was fearfully ravaged by the cholera, beginning with 1832–4; in 1849 and 1850 over 9,000 souls, or nearly 8 per cent of the entire population, perished of it. Yellow fever came in 1878. Floods have also risen over its platform several times and laid the lower section under water; those of 1832 ("the year of flood, fire, pestilence, and famine"), 1883, 1884, having been especially high and destructive. In 1838 the new and beautiful steamer Moselle exploded in front of the landing with a loss of almost a hundred and forty lives, one of the most terrible river disasters of the country. Two years later the city was the centre of the "log-cabin" campaign, which sent a favorite son, William Henry Harrison, to the White House. At a later time Hayes, whose previous active life had been spent in this city, occupied the Presidential position, and Salmon P. Chase, another famous Cincinnatian, was Chief Justice of the United States. A continuous excitement of the city was its fury over the race question and later the abolition movement. The vast Northern interest in Southern trade was everywhere a powerful restraining influence on this; but Cincinnati, on the border, and with its daily bread dependent on this trade, besides having a considerable percentage of its people of Southern birth and detesting the movement on general principles, felt menaced with entire industrial ruin if the agitation were not put down by force. Lane Seminary was threatened with fire, and its faculty with lynching if the students were not prohibited from discussing slavery; and in 1836 and 1841 James G. Birney's Philanthropist press was wrecked by the mob. In fact anti-negro riots were frequent and arose upon the slightest provocation. The trouble was later aggravated by the fact that Cincinnati, being a border city, was a chief station on the "Underground Railroad"; one Quaker citizen boasted of aiding 3,000 fugitive slaves to escape, and in all several times that number must have been smuggled across. Here, too, were tried the celebrated "fugitive slave cases," the Rosetta and Margaret Garner cases. In 1856 Buchanan was nominated for the presidency in Cincinnati; later nominees of Cincinnati conventions were Greeley in 1872, Hayes in 1876, and Hancock in 1880. When the war broke out, however, it became a strong Union city, and its record is noble. In 1862 the fear of an assault by the Confederate, Kirby Smith, caused it to be put under martial law for awhile; a somewhat similar experience came in 1864 at the time of the John Morgan raid. Another war incident was the Vallandigham case. Cincinnati sent its citizen, George B. McClellan, to command the armies of the North. The decade prior to the war had not been one of great progress, but in spite of the decay of trade with the South, the city leaped forward with the resumption of peace. The desire to renew the relations with its old business associates induced it to enter upon the construction of the Cincinnati Southern Railway to Chattanooga, which was built by the city itself, an extreme instance of municipal ownership. The celebrated "Bible" case in 1869 resulted in the abolition of religious instruction from the public schools and gave national fame to the bar that included such lawyers as those who argued the case. In 1869 began a series of annexations, which in a few years increased the city area from 7 square miles (3 when incorporated in 1819) to 24 square miles. Annexations in 1895 and 1903–4 have brought the area to 42½ square miles. The most notorious event in its later history is the "Cincinnati Riot" of 28–31 March 1884. As usual in modern times, the law had protected the criminal against the community till the criminal law was felt to be a farce; some murderers had received absurdly light sentences, and the patience of the lower orders gave way; they attempted to break into the jail and lynch the prisoners; foiled in this, they assaulted the court-house, and burned it, as well as its records and other buildings adjoining; the State militia had to be called in, and in the fray that ensued 45 persons were killed and 145 wounded. In 1888 the centenary of the settlement of the State and city was celebrated by a Centennial Exposition of the Ohio Valley, the culmination of a series of industrial expositions that had attracted the attention of the country and given a director-general to the Centennial at Philadelphia in 1876.

Consult: Ford, 'History of Cincinnati and Hamilton County' (1880); Miller, 'Cincinnati's Beginnings' (1880); Greve, 'Centennial History of Cincinnati' (1904); Drake, 'Picture of Cin-

cinnati' (1815); Drake and Mansfield, 'Cincinnati in 1826'; Cist, 'Cincinnati in 1841'; 'Cincinnati in 1851'; 'Cincinnati in 1859'; 'Cincinnati Miscellany' (1844-5); Stevens, 'Cincinnati' (1869); Burnet, 'Notes on Northwest Territory' (1845); Mansfield, 'Personal Memories, 1803-1843'; Directories of 1819, 1825, and 1829; and Mrs. Trollope, 'Domestic Manners of the Americans.'

JUDSON HARMON,
Ex-Attorney-General United States.

Cincinnati Anticline. In the period of disturbance which marked the close of Ordovician time in North America, the limestones deposited during the Trenton Epoch in the interior sea that covered most of what is now the Mississippi Valley were forced up, on a line running through southern Ohio, Kentucky, and Tennessee, in a low, broad arch. This arch is called the Cincinnati Anticline. It has been of much economic importance from its having contained great reservoirs of petroleum and natural gas, the latter now approaching exhaustion. See ORDOVICIAN SYSTEM; TRENTON EPOCH.

Cincinnati, Society of the (as having left the plow, like Cincinnatus, for their country's service, and returning to it when the need was over): a memorial society organized by the officers of the American Revolutionary army, 13 May 1783, just before their final dispersion, from the camp on the Hudson near Fishkill. The first meeting was in the Verplanck House, Steuben's headquarters. A society was organized for each State, besides the general society of which Washington was elected president. Membership was confined to officers of the Continental army who had served with honor three years, or been honorably discharged for disability, whether native or foreign, and to their direct male descendants in order of birth, through females in default of males, and then to collaterals if judged acceptable to the society. Partly as including several European nobles (Lafayette, Steuben, etc.), this was considered the beginning of an aristocratic order on European models, obnoxious to popular liberties. Of course it could only become such by government recognition, but the principle of heredity is *per se* un-American. With more show of reason, it was regarded as a military conspiracy to appropriate all the offices under the new government; a sign that the officers did not intend to be Cincinnatuses if they could help it. It was regarded by high and low as a grave public danger; and all the Revolutionary chiefs who had not been in the army, and were ineligible,— Franklin, Adams, Jefferson, etc.— distrusted its possibilities if not its motives. The legislatures of Massachusetts, Rhode Island, and Pennsylvania adopted resolutions censuring it as dangerous to the liberty and safety of the country; the governor of South Carolina denounced it in his message to the legislature; and the Irish chief justice of the same State, Ædanus Burke, wrote a pamphlet signed "Cassius," proving that it would subvert everything gained by the Revolution. This pamphlet was translated into French, and used by Mirabeau some years later. At the first general meeting, 7 May 1784, Washington persuaded them, in view of this public excitement, to abolish this hereditary feature. This, however, did not wholly conciliate popular feeling; and in 1789 the Tammany Society was founded in New York in avowed opposition, as a body where true equality should govern, and private advantage should not prevail over disinterested public spirit.

In 1787 Washington was elected president-general, and re-elected till his death; Alexander Hamilton succeeded him. Most of the State societies soon died, and the general society languished. When Lafayette visited this country in 1824, he was the only surviving major-general. The old hero's reappearance galvanized it into new life for a short time, but it sank out of sight again, and for many years was virtually dead, its chief function being an annual dinner in New York. Even a nominal organization was retained only in three or four States. The last survivor of the original association was Robert Burnet of New York, who died in 1854. In 1893 the general society began a successful effort to induce the States to revive or re-form their branches, and Connecticut first (1893) and Georgia last (1902) fill up the roll of the 13. Some of them issue publications.

The president-generals of the society have been: George Washington, Alexander Hamilton, Charles Cotesworth Pinckney, Thomas Pinckney, Aaron Ogden, Morgan Lewis, William Popham, H. A. S. Dearborn, Hamilton Fish, William Wayne, and Winslow Warren.

The emblem of the society, adopted at the outset, was a bald eagle suspended by a dark-blue ribbon with white borders, symbolizing the union of France and America. On the eagle's breast is Cincinnatus receiving a sword and other military insignia from the senate; in the background, his wife stands at the door of their cottage, with the plow and other agricultural implements near; round the whole are the words, *Omnia reliquit servare rempublicam* ("He left all to serve the commonwealth"). On the reverse, Fame is crowning Cincinnatus with a wreath, inscribed *Virtutis Præmium;* in the background, a seaport city with gates opened and vessels entering; below this are joined hands supporting a heart inscribed *Esto Perpetua* ("Be thou perpetual").

Cincinnati, University of. The University of Cincinnati owes its existence primarily to a bequest of Charles McMicken, who, in 1858, left $1,000,000 worth of property to the city of Cincinnati to found and maintain a college. One half of this property consisting of real estate in the State of Louisiana was lost in 1860 by a decree of the Supreme Court of the United States, annulling that section of McMicken's will giving this property to the university on the ground that the testator could not bequeath real estate in Louisiana to a foreign corporation. The university receives support from the city to the extent of $\frac{3}{10}$ of a mill on the total city tax. Other gifts have been utilized to contract buildings and to increase the endowment fund. The total value of the property and endowment was $2,260,761 in 1904. From 1858 to 1874 the income from McMicken's estate not being sufficient to support a college or university, the trustees decided to wait until a fund should accumulate or until additional support could be gained. Thus the present University of Cincinnati was not founded until 1874, although three departments of the university are much older, namely, the Astronomical Department, founded in 1842;

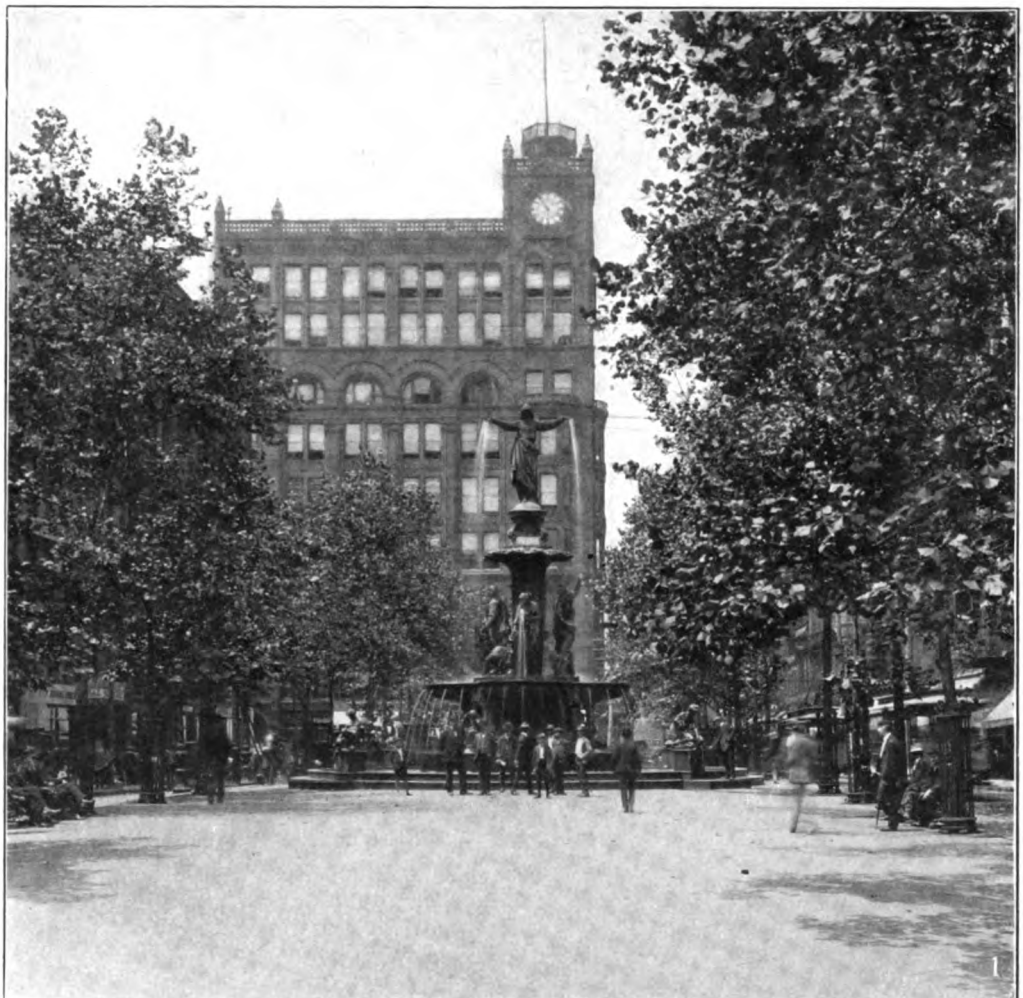
the Medical Department, founded in 1819; the Law Department, founded in 1819 (Cincinnati College). Until 1899 the University was composed of the following departments: Medical (founded 1819); Law (1819); Astronomical (1842); Academic (1874). Since 1899 the following departments have been added: the College of Engineering, offering courses in civil, electrical, chemical, architectural, and hydraulic engineering; the University Summer School; the University Library; the Teachers' College; the University Press; and the Technical School, which furnishes the shops to the Engineering Department, and is an integral part of the Teachers' College. The reorganization was effected under the presidency of Howard Ayers, LL.D. The Dental Department and the Clinical and Pathological School are only affiliated with the University of Cincinnati, having no financial or other connection with the University. The following scholarships are awarded to students of this university according to merit: the C. G. Comegys scholarship with an annual stipend of $50; five University scholarships with an annual stipend of $75; five McMicken honorary scholarships; twelve Thoms scholarships; the D. A. R. fellowship in American History established by the local chapter of D. A. R., with an annual stipend of $200. No tuition is charged to residents of the city of Cincinnati who enter the university as students. All others who enter the Academic Department are charged a tuition of $75 per year. The professional schools charge from $75 to $125 annual tuition. The University of Cincinnati possesses a beautiful location in Burnet Woods Park, away from the noise and dirt of the city. Its government is by a board of directors appointed for six years by the mayor of Cincinnati. The intellectual life of the University finds expression in the publication of many memoirs, and monographs on literary and scientific subjects through the very important department of the University that has been recently established, namely, the University Press. These contributions to knowledge in the form of an annual volume of university bulletins are distributed by exchange all over the world. The total number of laboratories in the University is 35 in 1904; the total number of volumes in the University Library, including pamphlets, is 143,463. The teaching corps numbers 156, and the students 1,360.

HOWARD AYERS, LL.D.,
President of the University of Cincinnati.

Cincinnatus, sĭn-sĭn-nā'tŭs, **Lucius Quinctius,** a patrician belonging to the earliest period of the Roman republic: b. about 519 B.C. The legend which makes him the beau-ideal of the virtuous Roman is as follows: The Romans of his day were weakened by dissensions between the patricians and plebeians; the warlike Æquians, after making harassing incursions into their territory, succeeded at last in surrounding the Roman army under the consul Minucius in the wooded grounds of Mount Algidus. In despair the Roman senators went to Cincinnatus, offering him the dictatorship. The messengers found him at the plow. Reluctantly he accepted the office. He succeeded in rescuing the army from its perilous position, and marched to Rome laden with the spoils of victory. He then returned to his farm, whence he was again called at the age of 80, to resume the dictatorship, to oppose the machinations of Spurius Mælius, and prevent a civil war between the upper and lower classes, which he succeeded in doing.

Cinematograph, sĭn-ę-măt'ō-grăf (Gr. *κίνημα*, "movement," from *κινεῖν*, "to move"), an ingenious instrument introduced about 1895 by two brothers Lumière of Lyons, and founded on the same principle as Edison's kinetoscope. The most important part of the instrument is a sensitive photographic film or band about an inch and a quarter broad and about 50 feet long. This band passes over a drum of moderate size, then down and round a small one, which deflects it upward toward another small drum, and after passing over this one it winds round another large drum in the centre of the instrument proper. Each portion of the film in the course of its motion passes vertically close behind an opening situated above the last three drums, but below the first one. This opening does not communicate directly with the outside, but is placed in the partition dividing the part of the apparatus containing the last three drums from an adjacent part situated below that containing the first drum. Facing this aperture, and fixed in the opposite wall of that box which does not contain the three drums, is an objective through which light passes into the interior. Thus, by means of a peculiar arrangement of eccentrics which secures that each portion of the film shall be stopped for an instant before the opening, about 15 photographs per second can be received on the film, each representing the photographed group at a different instant from the others. In order to transform these negatives into positives, the negative film is rolled back on to the first drum, and on a second similar drum below it in the same compartment of the apparatus another film is rolled. The two films are then unrolled simultaneously, and thus the light entering through the objective and the aperture imprints on the new film a positive impression of the scenes represented on the other one. The positive film is made to wrap itself round the drum in the lower part of the apparatus, while the negative one is made to pass off through the bottom. The positive film is now wound back onto the first drum, and the instrument is then ready to project the representations on a screen at some distance. To do this, lantern accessories are necessary, but beyond that all that is required is to unwind the positive film by means of the same mechanism as performed the previous operations. The screen receives enlarged representations of the successive film-photographs in the same order as that of taking, and separated by such small intervals of time as to cause the whole to blend and form apparently a continuous representation of a moving group during a fairly long period of time. The advantages of this mode of photographing and throwing pictures on a screen over the older methods are obvious. Movements too rapid to be analyzed by the eye can, by controlling the rate of working while they are being represented on the screen, be made slow enough to permit of their true nature being observed; and, similarly, movements too slow for comprehension or rapid observation may often be, as it were, quickened.

CINCINNATI.



1. Fountain Square; Tyler-Davidson Fountain.

2. University of Cincinnati Buildings.

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Cinerary (sĭn'ē-rā-rĭ) **Urns,** urns in which the ashes of the dead were deposited after the body was burned. Many Greek and Roman urns are in a high style of art, and are formed of bronze, marble, glass, or pottery ware. See BURIAL.

Cingalese. See SINGHALESE.

Cinna, sĭn'ạ, **Lucius Cornelius,** Roman patrician, associate of Marius, and leader of the popular party, during the absence of Sulla in the East. In 86 B.C. he was elected consul along with Octavius, and in violation of his oath to Sulla, he attempted to overpower the senate and to procure the recall of Marius and his party from banishment. In the contest which ensued, he was defeated by his colleague and driven from the city. His office thus became vacant, and the senate appointed another consul in his stead. He soon returned, however, along with Marius, and laid siege to Rome. The senate was forced to capitulate; but while the votes of the people were being taken for the repeal of the sentence against Marius, he broke into the city, massacred the friends of Sulla, and allowed his partisans to commit frightful excesses. He was consul for the next three years; but Sulla, having brought the Mithridatic war to a close, resolved (84 B.C.) to return to Italy to inflict condign punishment on his enemies. Cinna prepared to resist him by force of arms, but was prematurely slain by a mutiny among his own troops.

Cinnabar, sĭn'nạ-bär, red sulphide of mercury, HgS. The native cinnabar occurs in earthy, granular, and massive forms, and also in crystals belonging to the rhombohedral system. It is red, not infrequently with a brownish or leaden cast. Its hardness is from 2 to 2.5, and its specific gravity from 8.0 to 8.2. Artificial cinnabar, formed by subliming a mixture of sulphur and mercury, is brighter in color than the native mineral, probably on account of its greater purity, and is known in commerce as "vermilion." Cinnabar is the principal ore of mercury, and large deposits of it occur at Almaden, Spain, at Idria in Carniola, at New Almaden, Cal., and in certain parts of China and Japan. When it is roasted the sulphur burns away, and metallic mercury distils off and is condensed in earthenware vessels. (For a discussion of various ancient references to cinnabar, see 'Engineering and Mining Journal,' 16 May 1903, p. 747.)

Cinnamic (sĭn'ạ-mĭk) **Acid,** an acid which exists in the free state in the balsams of tolu and Peru, in liquid storax, and in gum benzoin. When oil of cinnamon is exposed to the air it absorbs oxygen and deposits crystals of cinnamic acid, which are colorless, and readily soluble in alcohol, ether, and boiling water, but sparingly soluble in cold water. It is not of any importance in the arts and is chiefly interesting as being the acid corresponding to oil of cinnamon. This oil is the aldehyde of cinnamic acid, and is represented by the formula $C_9H_8O_2$. Though isomeric with oil of cassia it has a slightly different flavor, and is much more expensive. Both of these oils are employed in medicine as aromatic stimulants, but chiefly as pleasant adjuncts to disguise the taste of nauseous drugs. From a chemical point of view, the cinnamic acid and oil of cinnamon are related to benzoic acid and oil of bitter almonds; and cinnamic acid may be converted into benzoic acid by oxidation.

Cinnamic acid is one of the active principles in many of the balsams and enjoys an excellent reputation in the treatment of tuberculosis and chronic ulcerative processes. It is a marked stimulant to the skin and mucous membranes, and has been very widely used in the form of an emulsion for the treatment of joint tuberculosis. Extravagant claims were made for it years ago, but these have been shown to be premature, although at the present time the drug is very widely used.

Cin'namon, the bark of the under branches of a species of laurel (*Cinnamomum zeylanicum*), which is chiefly found in Ceylon, but grows also in Malabar and other parts of the East Indies. The tree attains a height of 20 or 30 feet. Its leaves are oval, the flowers are of a pale yellow color, and the fruit is shaped somewhat like an acorn. There are two principal seasons of the year in which the Ceylonese bark the cinnamon-trees. The first of these commences in April, and the last in November; the former being that in which the great crop is obtained. In this operation the branches of three years' growth are cut down, and the outside pellicle of the bark is scraped away. The twigs are then ripped up lengthwise with a knife, and the bark is gradually loosened till it can be entirely taken off. It is then cut into slices, and on being exposed to the sun curls up in drying. The smaller pieces, or "quills," as they are called, are inserted into the larger ones, and these are afterward tied into bundles. Cinnamon is examined and arranged according to its quality by persons who, for this purpose, are obliged to taste and chew it. This is a very troublesome and disagreeable office, few persons being able to hold out more than two or three days successively. After this examination, the bundles are made up to a length of about four feet, and a weight of about 88 pounds each. From the roots of the trees numerous offsets shoot up. These, when they have attained the height of about 10 feet, are cut down and barked, being then about the thickness of a common walking-stick. The cinnamon which they yield is much finer than any other. In Ceylon the cinnamon-trees are said to be so common as to be used for fuel and other domestic purposes. The smell of cinnamon, particularly of the thinnest pieces, is delightfully fragrant, and its taste pungent and aromatic, with considerable sweetness and astringency. If infused in boiling water in a covered vessel it gives out much of its grateful flavor and forms an agreeable liquid. An oil is extracted from cinnamon, which is heavier than water. This is prepared in Ceylon, and almost wholly from the small and broken pieces. It is made, however, in such small quantity that the oil of cassia is generally substituted for it: indeed, the cassia bark is often substituted for cinnamon, to which it has some resemblance, although in its qualities it is much weaker. The leaves, the fruit and the root of the cinnamon plant all yield oil of considerable value. That from the fruit is highly fragrant, of thick consistence, and at Ceylon was formerly made into candles for the sole use of the king.

The oil of cinnamon consists mainly of cinnamic aldehyde, C_9H_8O, which, when pure, is

colorless. By exposure to air it absorbs oxygen and is converted into cinnamic acid (q.v.).

Various forms of cinnamon have been used for many years in medicine as flavoring agents and as carminatives. As cinnamon is rich in volatile oils, the action of the drug resembles the action of the oil of cinnamon, which is closely allied to other volatile oils (q.v.). The active principle in the oil is an aldehyde of cinnamic acid, and its antiseptic and antispasmodic action is due in large part to the cinnamic aldehyde.

Cinnamon Fern, a species (*O. cinnamomea*) of royal fern (*Osmunda*), so called from the cinnamon color of the sporanges. The plant has been known to reach the height of 11½ feet. It is frequent in boggy places during May and June in Florida and Mexico, and as far north as Minnesota and Nova Scotia. See OSMUNDA.

Cinnamon Oil, an essential oil distilled from cinnamon bark. It is of a bright yellow color, which gradually darkens. It consists chiefly of cinnamic aldehyde. When exposed to the air, it gradually absorbs oxygen and forms a resin and cinnamic acid.

Cinnamon-stone, or Essonite, a variety of grossularite garnet, usually of a beautiful cinnamon-brown, yellowish, or brownish-red color. It is a silicate of aluminum and calcium. Its name essonite is derived from the Greek *esson,* inferior, and refers to its hardness, 7, being inferior to that of hyacinth, which it often resembles. It occurs in isometric crystals, usually in rhombic dodecahedrons. Cinnamon-stone from Ceylon is the finest known, and has long been cut into gems. Beautiful specimens are also found at Piedmont, Ala., and Phippsburg, Me.

Cinnamomum, sĭn-ą-mō'mŭm, a tropical genus of plants of the laurel family, natives of Asia and the Pacific islands. The genus numbers upward of 50 species, all possessing aromatic volatile oils, that make them valuable articles of commerce. Cinnamon proper is the prepared bark of *C. zeylanicum;* Culiwan bark comes from the *C. culiwan,* and cassia bark from *C. cassiæ.* The best-known American relative, although not of the same genus, is sassafras. See CASSIA; CINNAMON; LAURACÆ.

Cino da Pistoia, chē'nō dą pēs-tō'yä, Italian jurisconsult and poet: b. Pistoia 1270; d. there 24 Dec. 1336. He ranks among the best of the early Italian poets, and resembles Petrarca more than any of the other predecessors of this poet. His poems were first published at Rome in 1558 by Pilli. They afterward appeared at Venice increased by a second volume, which, however, was not considered genuine. The most complete edition is that of Ciampi (1812). He published a commentary on the first nine books of the 'Codex Justinianus' in 1314.

Cinquefoil, sĭnk'foil. 1. In botany, a species of the genus *Potentilla* of the Rose family, closely allied to the strawberry. There are upward of 150 species, chiefly natives of the temperate regions of the northern hemisphere, 60 of them occurring in North America, being found in Greenland, south to New Jersey, to northern Mexico, and in all the territory of the western and northwestern part of America to Alaska. In northern New England the shrubby cinquefoil (*P. fruticosa*) is a troublesome weed. The name of the genus is from Latin *potens* (powerful), from the supposed powerful medicinal virtues of some of the species.

2. In architecture, an ornament in the Gothic style, consisting of five foliated divisions, often seen in circular windows. In heraldry, it means a five-petalled corolla borne without a stalk and full-faced.

Cinq-Mars, Henri Coiffier de Ruze, ŏñ-rē kwä-fē-yā dė rü-zā săñ-mär, MARQUIS DE, French courtier: b. 1620; d. Lyons 12 Sept. 1642. At the age of 18 he was presented at court by Cardinal de Richelieu, and soon obtained the favor of Louis XIII., to whom he became master of the horse. Chafing at the restraint under which Richelieu held him, and ambitious of political power, he framed a conspiracy to overthrow the cardinal, of which the king himself, and his brother Gaston, Duke d'Orleans, were members. But Louis was weak and fickle, Gaston perfidious, and Richelieu not the man to be put down by a youth just turned of 20. Cinq-Mars was delivered up to the cardinal, and beheaded at Lyons with his friend, the councilor De Thou.

Cinq-Mars, a historical romance by Alfred de Vigny, published 1826. The subject is the conspiracy of Cinq-Mars and De Thou against Richelieu, its detection, and the execution of the offenders at Lyons in 1642. The work is modeled after the Waverley novels.

Cinque Pace, sĭnk-pās, a kind of grave, stately dance, in which the steps were regulated by the number 5.

Cinque Ports, sĭnk-pōrts, seven ports of England, on the coasts of Kent and Sussex — Dover, Sandwich, Hastings, Hythe, Romney, Winchelsea, and Rye. They were originally only five, the two latter having been declared ports subsequent to the first institution; hence the name *cinque,* five. The precise designation of these seven localities is "The Cinque Ports and the Two Ancient Towns," the last named being Winchelsea and Rye. They were granted special privileges by the later Saxon and earlier Norman kings, on condition of providing a certain number of ships during war, there being no permanent English navy previous to the reign of Henry VII. The ports are, collectively, in the jurisdiction of a lord warden, whose office, though the salary is £3,000 a year, is little more than a sinecure. See Burrows, 'The Cinque Ports' in Historic Towns series.

Cinquecento, chĭng-kwē-chĕn'tō, in Italian, 500, an abbreviation for *mille cinquecento,* or 1,500. The term is used to designate the art styles of the 16th century, or such as were developed about, or after, 1500. In like manner the terms *trecento* and *quatrocento* denote art of the 14th and 15th centuries. The Cinquecento is the period of the highest perfection of the arts of the Revival or Renaissance.

Cintra, sēn'trä, Portugal, a town in the province Estremadura, 15 miles northwest of Lisbon, on the slope of the Sierra de Cintra. The country around is extremely beautiful, and the climate mild and agreeable. On these accounts it is much resorted to by the wealthier inhabitants of Lisbon, who have here their *quintas* or country houses. The kings of Portugal have a palace at Cintra, with fine gardens

ornamented with fountains. Cintra is celebrated for the convention entered into there in 1808, by which the French, after their defeat at Vimeira, were not only permitted to leave Portugal, but were conveyed to France with their arms, artillery, and property. Pop. 4,846.

Cinura, sī-nū'ra, a name proposed by Packard for a subdivision of the *Synaptera* under *Thysanura.* It includes the bristle-tails (q.v.) See Packard, 'Entomology for Beginners.'

Ciotat, sē-ō-tä, **La,** France, a seaport, department of Bouches-du-Rhône, on the Mediterranean, 15 miles southeast of Marseilles. It has a safe and commodious harbor, and carries on a considerable trade in the productions of the district. The yards and workshops of the Messageries Maritimes Company employ about 3,000 hands. The town, surrounded by its old ramparts, consists of well-built houses and spacious well-paved streets. The surrounding district yields wine, oil, oranges, etc. Pop. 11,300.

Cipher, a kind of monogram, in which the initials of a person or persons are intertwined with each other.

Cipher Despatches. On the meeting of Congress in December 1876, owing to the disputed presidential election returns, each chamber instituted an inquiry into the alleged frauds; the Senate (Republican) through its committee on privileges and elections; the House (Democratic) by a select committee on Louisiana affairs, popularly known as the Morrison Committee, from its chairman, William R. Morrison (q.v.). Each committee subpœnaed the Western Union Telegraph Company for the political despatches of that period in its possession; and portions of these, which the company had gathered from its various offices and forwarded to New York, were sent to each. A large number of these were in cipher; their political nature being inferred from the names and locations of senders and addressees. The Senate, though calling for telegrams from all portions of the country, devoted themselves mainly to Oregon where, it was alleged, from the translation of Democratic cipher telegrams, $8,000 had been devoted to securing the legislature's recognition of a Tilden elector. (These telegrams and translations were published in Senate Miscellaneous Document No. 44, 44th Congress, 2d session.) These despatches, after the investigation closed, were ostensibly returned to the Western Union; those from the Morrison Committee apparently were all returned. But the cipher despatches before the Senate committee were sorted over and the Republican ones nearly all destroyed (by Senator O. P. Morton, as said); while certain packages of the Democratic ones were preserved (by the same hands), and came into possession of Thomas J. Brady, the second assistant postmaster-general, William E. Chandler, afterward secretary of the navy, then lawyer and political manager, and Frank Hiscock, representative from New York. By these, in the summer of 1878, they were sent to Whitelaw Reid, editor of the New York *Tribune,* who published them serially, including the cipher despatches and professed translations. These were made by John R. G. Hassard and Col. William M. Grosvenor, of the *Tribune* staff, partly on suggestions of Prof. E. S. Holden of Washington; involved the use of several different ciphers, and different applications of the same cipher; and left some words illegible. As printed, they referred to offers of the disreputable "returning boards," then supreme in South Carolina and Florida, to sell their vote to Tilden for large sums in cash, $80,000 to $200,000; and negotiations of Democratic managers with them, closed by Tilden's refusal to make the bargain, and the transfer of the votes to Hayes. Tilden himself denied all knowledge of the telegrams or their subject matter, and the managers denied the accuracy of the translations. Their moral defense in the public mind was that they were submitting to blackmail to obtain what they believed legally and equitably theirs already, and that the Republican telegrams, if published, would have left that party in no better case. On 21 Jan. 1879 the new House appointed a "select committee on the alleged frauds in the election of 1876," avowedly to investigate the cipher despatches. It received from Benjamin F. Butler of Massachusetts another package of the telegrams, partly unpublished, given him by Mr. Chandler, and took a mass of testimony — published in House Miscellaneous Documents, 45th Congress, 3d session, Vol. V., with the telegrams and the translations, except those already published in the Senate document above cited.

Ciphers, signs for numbers (see NOTATION). They are either borrowed signs, as letters, with which the Greeks and several tribes of the north of Europe designated their numbers; or peculiar characters, as the modern or Arabic ones. The ciphers, such as they are at present, 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, did not attain their present character till a pretty late period. We have them from the Arabians, who derived them from Hindustan. It seems probable that the Egyptians were acquainted with the present system of ciphers, at least in its principles. As early as the 9th century ciphers were used, though seldom, in France. Not until the 11th century did their use become common in Europe.

Cipher Writing, a method of sending important intelligence in a manner so effectually disguised that only those for whom the news is intended can understand the meaning of what is written. Till comparatively recent years diplomats, statesmen, and military or naval commanders were the principal persons compelled by circumstances to keep their affairs or their intended movements shrouded in secrecy. So long as there was not regular postal service important letters were sent by courier, and thus the weightiest secrets were often at the mercy of any one inclined to be dishonest. Before the spread of education, and at a time when few possessed a knowledge of any other language than their own, to indite a letter or despatch in a foreign tongue was usually ample protection against a surreptitious prying into its contents. But it is now many years since this safeguard was broken down, and it became necessary for all who did not want their correspondence known to interested parties to contrive some means of communicating with the pen that would defy scrutiny.

Hence there came into extensive use the art of writing in cipher, called also cryptography, from the Greek words *κρυπτός,* "secret," and *γράφειν,* "to write." Under this term are in-

cluded all private alphabets or systems of characters for the safe transmission of secrets. As fast as one device was discovered human ingenuity contrived another still more intricate. A cipher sufficiently perplexing for all ordinary purposes is found by using the alphabet in any language in an inverted order, taking Z for A, Y for B, X for C, and so on. When it is only desired to write a cryptogram, and not print it, such other characters may be used as are mutually agreed upon by correspondents, or the alphabet may be transposed in other ways. A figured cipher is one in which the letters of the alphabet are numbered, and these numbers compose the cryptogram. To insure secrecy it is, of course, necessary that the particular series of numbers chosen shall be known only to those who use the cipher. Another plan consists in choosing a certain book — a dictionary appears to have been the favorite — and by a simple citation of the number of the page, of the column, and of the line, sentences were constructed, the key to which was extremely difficult of discovery by one not in the secret.

As the number of different dictionaries was necessarily limited, however, the mystery could usually be solved by any one willing to devote time and patience to hunting up the particular one adopted. Various other books have been similarly used, such as spelling-books, and even the Bible; but these systems were cumbersome, and were all more or less open to detection. From a few rules, as for instance, that in English *e* is the letter which most frequently occurs, and *the* the most common word, the whole might generally be deduced. The task of detecting cipher methods is rendered much more difficult when false characters, which are not to be counted, have been interspersed throughout the cipher. A curious explanation of the process of unraveling a cipher is given in Poe's story of the 'Gold-Bug.' Still, with devices such as these, more or less ingenious, the world was fain to be content until about 40 years ago, when a scientific discovery was made that indirectly converted cryptography into a recognized calling, requiring thought, labor, and inventive ability.

The opening years of the second half of the 19th century found the world in amazement over the then recent invention of telegraphy. Immediately a new want made itself felt. Secrecy had been sacrificed at the shrine of speed. If the mail was slow, it afforded privacy, but the contents of a telegraphic message are of necessity known to others besides the sender and the receiver. So the minister, the banker, and the merchant soon began to send cipher despatches. It was quickly discovered, however, that existing methods of cipher writing were unadapted to telegraphy; the costliness of the new invention necessitated brevity; and thus it was not long before there went whirling over the wire messages of 10 words that, properly deciphered, included from 30 to 50.

A great proportion of commercial messages — orders to buy and sell and the like — are similar in their terms, and hence it is that a single word representing three or four words in frequent use is the plan on which our present cable ciphers are based, whereby there is annually a large saving in expense. Then, too, as trade increased and competition became fierce, every firm wanted its own cipher system, distinct from any used by other houses in the same business; and reflection will enable us to appreciate the vast number of separate ciphers in use in a great commercial centre like New York. Therefore, in course of time, the preparation of cipher systems for merchants and others using the telegraph largely came to be a regular calling, and in every large city the sign "Cable Codes" is to be seen.

At one of these offices a person may be accommodated with a code of from 50 to 5,000 words. Most of these codes are alphabetically arranged in parallel columns, like shipping signals — the English words and phrases in one column, and their cipher equivalents in another. To such magnitude has this business grown that all languages are ransacked for suitable cryptographic codes, and every day sees their preparation growing more complicated and costly. The modern telegraphic signals and our various systems of short-hand may be called examples of cipher writing, though in these cases, of course, speed and brevity are aimed at, not secrecy.

The cipher codes of the State Department at Washington are frequently changed. The special code is entrusted to the personal custody of diplomatic officials embarking on a mission, who retain possession of it and destroy it if their lives are endangered. The imprisonment of the United States Minister Conger, in Peking, in 1900, caused the cipher to figure conspicuously in international relations. China objected to the transmission of cipher despatches, but subsequently withdrew her objection. She was accused of having obtained surreptitious possession of a copy of the United States cipher code.

Cippus, sip'ŭs, a low column generally rectangular and sculptured, and often bearing an inscription, used by the Romans for various purposes. Cippi served as sepulchral monuments, as milestones and boundaries, and in some cases to receive the inscribed decrees of the senate. They were frequently or usually adorned with rams' heads supporting festoons of flowers, figures of sphinxes, and various mythological subjects. Those serving as tombstones regularly bore such inscriptions as D.M. for *Dis Manibus,* and S.T.T.L. for *Sit tibi terra levis.*

Cipriani, Giambattista, jäm-bät-tēs'tä chē-prē-ä'nē, Italian painter and engraver: b. Pistoia 1732; d. London 1785. He was one of the first Fellows of the Royal Academy. His drawing is correct, his heads have grace and loveliness, his coloring is harmonious, and the general impression of his composition good. Many fine engravings of Bartolozzi are from the designs of Cipriani.

Circars, sėr-kärz', **The Five Northern,** an ancient division of the Madras presidency, on the east coast of Hindustan. The northern Circars were formerly Chicacole, Rajahmundry, Ellore, Condapilly, and Guntur; but the districts that now correspond most nearly with them are those of Ganjam, Vizagapatam, Godavari, and part of Krishna. They were among the earliest of the territorial possessions of the East India Company, which acquired four of them in 1765, from Mogul Shah Allum, who bestowed them on the company as a free gift.

The fifth, Guntur, came into the possession of Great Britain in 1788.

Circassia, sĭr-kăsh'ĭ-ą, a region in the southeast of European Russia, lying chiefly on the north slope of the Caucasus, partly also on the south, and bounded on the west by the Black Sea. It forms part of the government of the Caucasus, including a great portion of the territory of the Kuban and the districts of Sukhum and Tchernomore, but is not itself an official division; and, indeed, the name is now much less seldom heard than formerly, since the country has been entirely incorporated with the rest of the Russian possessions in this quarter, and has no longer a separate political existence. The whole region is mountainous, and is composed of the northern masses or western offshoots of the great chain of the Caucasus, the culminating heights of which are those of Mount Elbruz. The mountains are intersected everywhere with precipitous ravines, in the deepest hollows of which flow rock-impeded streams that occasionally become raging torrents. The chief rivers are tributaries of the Kuban and the Terek, the first of which bounds the territory on the northeast and east sides, while the Terek skirts the Circassian limits on the southeast side. Circassia is a beautiful, though rugged, country. The sides of the mountains are often clothed with thick forests. Its climate is temperate, its inhabitants healthy and long-lived. There are few manufactures and little trade.

When Russia took possession of this region the exodus of the inhabitants left but comparatively few Circassians proper, and those who remained have now to a large extent lost their national peculiarities. The people call themselves Adighé; the Tartar word *Tchertkess* being a slanderous name applied to them as "robbers." The Circassians were divided into several tribes, having three distinct languages, or more. Each tribe included five ranks of men, namely, princes or chiefs (*pshat*); nobles (*vork*); middle class (*thlofokl* or *tokavs*); serfs, or retainers of the nobles; and slaves — the latter being prisoners taken in war, or the descendants of such. All classes except the slaves were united into fraternities, for mutual support; and this union formed the real groundwork of the government of the country, which was altogether peculiar, being patriarchal in nature, with a great amount of freedom. Hereditary feud, once prevalent, was latterly almost extirpated, and pecuniary compensation, including a mulct upon manslayers for the benefit of the deceased's fraternity, was substituted. Crimes of all degrees, and civil causes, were judged either in general or local councils; and petty offenses by district judges and assessors.

The religion of the country was chiefly Moslem; but in many cases it formed a jumble of Christian, Jewish, and heathen traditions and ceremonies. In no case was it very strict; although most of the chief Mohammedan feasts and fasts were pretty well observed. The morals of the people were nevertheless respectable. Great crimes were rare; and such as have their source in poverty with one class, and avarice in the other, were not common, for property was little coveted, and money was scarcely known. The commerce of presents was universal; few or none were very rich, and there were no miserably poor at all. There was no tenure of land in Circassia except what immediate possession, for the purposes of cultivation, gives.

Agriculture here is still in a rude state, but the produce of the tilled lands is considerable, and exceeds local wants. The forests yield great quantities of fine wood, including, oak, and all our own best species of timber trees, with (in the southern regions) boxwood, etc. The chief grain is millet; but barley, oats, and a little wheat are also raised. There are great numbers of goats, sheep, and oxen.

The Circassians, male and female, are a well-formed and handsome race. The males are highly prized as warriors by the Russians, and the females as mistresses by the Turks, a position generally envied by the women themselves. The men are among the finest equestrians in the world; and their horses, though small, are of good make, hardy, and intelligent.

The early history of the Circassians is obscure. They have no annals; but their minstrels, in their martial and genealogical strains, preserve traditional accounts of the deeds and lineage of their dead heroes and existing tribes. Between the 10th and 13th centuries this country formed a portion of the empire of Georgia, and it is said the Georgian queen Tamar subjected and for a time Christianized them. During the Middle Ages the Genoese had several trading stations on the coast, of which some memorials yet exist. In 1424 the Circassians were an independent people, and at war with the Tartars of the Crimea, etc., to whose khans, however, it is understood some were occasionally tributary. In 1555 the Muscovite czar, Ivan Vasilievitch, came to their aid against the Tartars, and married a Circassian princess. But the stay of the Russian forces was short, and after their withdrawal the belligerents kept up a struggle with varying results till 1705, when the Tartars were finally defeated in a decisive battle. Shortly after the territorial encroachments of Russia on the Caucasian regions began. From that time she advanced by steps slow and stealthy, and in 1781 obtained a frontier line on the right bank of the Kuban, the left banks of which formed the national limit of Circassia. In 1784 the Turks founded Anapa, near the northeast corner of the Black Sea, as a place of trade for their commerce and that of the Circassians; this was the only territorial settlement they as yet had in or near the country, and the place was a mere factory. In 1807 the Russians took Anapa from the Turks; but in terms of the Treaty of Bucharest, in 1812, it was restored. In 1829 it was once more taken by the Russians, and finally ceded to them by the Treaty of Adrianople, along with the whole of Circassia — as they interpreted the words of that cunningly ambiguous document; the fact being that not an inch of the territory of Circassia proper had ever been in the possession of either Turks or Russians. Many of the Circassians were, indeed, Mussulmans, and all such recognized the padisha (sultan) as their spiritual head, but nothing more. As the "hated Muscovites" (*fana Moscov*) immediately proceeded to act upon the pretended cession, a struggle commenced which was continued over a long series of years. The spirit of resistance to Russia became stronger than ever; and a bold leader, Schamyl, who united

in his person the imputed sanctity of the hierarch with the daring courage and prudent conduct of a great warrior, with his heroic band beat off or baffled the whole disciplined forces that Russia was able to send against him. But at length the protracted resistance of the people terminated in the triumph of the more powerful of the two foes, and the Circassians with their leader surrendered. Large numbers of them, as many it is said as 500,000, were deported into the Turkish provinces in 1864, and were settled both in Asia Minor and in Bulgaria and Servia. A considerable portion of their former country was thus almost denuded of inhabitants.

Circe, sêr'sē, in classical mythology, a sorceress on the island of Aeaea. Ulysses in his wanderings landed on her island, and sent out Eurylochus with a party to explore the country. They arrived at the palace of Circe, who gave them food and wine, and with her magic wand changed them into swine. Eurylochus only, by cautiously abstaining from the magical potion, escaped the transformation, and informed Ulysses of the event. He immediately proceeded himself into the country to free his companions. On the way Hermes (Mercury) met and advised him. Following the advice of Hermes he then ran upon her with his drawn sword, threatening her with death, and compelled her to bind herself by an oath to do him no injury, and deliver his companions. Ulysses then remained with her a whole year. Before his departure she told him that in order to secure a safe return to his country he must visit the infernal regions and ask advice of Tiresias. This he did, and again visited Circe on his way back.

Circinus, sêr'sĭ-nŭs ("the Pair of Compasses"), one of the 14 southern constellations added to the heavens by Lacaille in connection with his work at the Cape of Good Hope in 1751–2. It is surrounded by Apus, Musca, Centaurus, Lupus, Norma, and Triangulum Australe.

Circle, in geometry, a plane figure contained by one line, which is called the "circumference" and is such that all straight lines drawn from a certain point (the "centre") within the figure to the circumference are equal to one another. According to this definition of Euclid, which is remarkable for its perspicuity and precision, the circle is the space enclosed, while the circumference is the line that bounds it. The circumference is, however, frequently called the circle. Still no confusion ever arises from this usage.

The properties of the circle are investigated in books on geometry and trigonometry. Properly the curve belongs to the class of conic sections, and is a curve of the second order.

The celebrated problem of "squaring the circle" has given rise to extraordinary geometrical labors, and even now there are to be found, as in the case of the problem of perpetual motion, those who profess to have solved it. The question is to find a square whose area shall be equal to the area of a circle. It is not possible to do so. All that can be done is to express approximately the ratio of the length of the circumference of the circle to the diameter, and to deduce the area of the figure from this approximation. This ratio has, however, been determined to a degree of exactness more than sufficient for all practical purposes. If the diameter be called unity, the length of the circumference of the circle is 3.1415926535...; and the area of the circle is found by multiplying this number by the square of the radius. Thus the area of a circle of 2 feet radius is 3.14159×4, or 12.56636 square feet, approximately.

For trigonometrical calculations the whole circumference of the circle is divided into 360 equal parts or arcs, called degrees; each degree is divided into 60 minutes, and each minute into 60 seconds. The angles subtended at the centre by these arcs are called respectively degrees, minutes, and seconds of angle.

In practical astronomy a circle is an instrument for measuring angles by means of a metallic circle accurately divided. The general principle is to have a telescope movable accurately in one vertical plane, and an arm attached to it which moves over the graduated circle placed in a parallel plane. The arm carries microscopes and verniers for reading off minutely the angle it has traversed.

There are two great classes of these instruments, transit circles and mural circles (qq.v.); and there are other less important instruments of this kind.

In logic, a circle is the fault of an argument that assumes the principle it should prove, and afterward proves the principle by the thing which it seemed to have proved. The same fault takes place in definitions when an idea is defined by others which suppose the knowledge of the first. Arguing in a circle is a fault into which men are very liable to fall, particularly in theological discussions.

In astronomy, the heavens being considered as a spherical surface drawn round the earth as centre, an imaginary line drawn round the heavens so as to lie in one plane is a circle of the sphere. It is a "great circle" if the plane of it passes through the centre; thus the celestial equator and the ecliptic are great circles: if the plane of the circle does not pass through the centre it is called a "small circle"; all circles of declination except the equator are small circles.

Circle of Curvature. When a point in motion is tracing out any curved path, the direction of motion changes from point to point of the curve, and the path is said to be more or less curved according as the direction of the motion of the point changes more or less rapidly. The curvature at any point is measured by the rate of this change at the point per unit length of the curve.

In the case of the circle the curvature is the same at every point; and it is easy to show that the curvature measured as above is equal to the reciprocal of the radius of the circle.

If we consider any small portion of any curve whatever, it may be approximately taken as an arc of a circle, the approximation being closer and closer to the truth as the portion considered is smaller and smaller, and by taking it small enough we may make the approximation as close as we please. The curvature is then the reciprocal of the radius of this circle.

The circle which coincides more nearly than any other with an infinitely small arc at any point of any given curve is generally found by means of the methods of the differential calculus. Such a circle is called the circle of curva-

ture, and sometimes the osculating circle. The radius of it is called the radius of curvature of the curve at the point considered; and the centre of this circle is called the centre of curvature.

Circle, Magic, a space in which sorcerers were wont to protect themselves from the fury of the evil spirits they had raised. This circle was usually formed on a piece of ground about nine feet square (in the East seven feet appears to have been considered sufficient), in the midst of some dark forest, churchyard, vault, or other lonely and dismal spot. It was described at midnight in certain conditions of the moon and weather. Inside the outer circle was another somewhat less, in the centre of which the sorcerer had his seat. The spaces between the circles, as well as between the parallel lines which enclosed the larger one, were filled with all the holy names of God, and a variety of other characters supposed to be potent against the powers of evil. Without the protection of this circle, the magician, it was believed, would have been carried off by spirits. Another figure which, described upon the ground, could bar the passage of a demon, was the pentagram.

Cir'cleville, Ohio, a city and county-seat of Pickaway County, on the Scioto River, the Ohio Canal, and the Cincinnati & M. V. and the Norfolk & W. R.R.'s, 28 miles south of Columbus. It derives its name from a circular earthwork built by some ancient people, and which is the site of the present city. It has numerous churches, several daily and weekly newspapers, three banks, and manufactures flour and meal; agricultural implements, furniture, canned goods, etc., and a large pork-packing industry. Pop. (1900) 6,991.

Circuit Court. See COURTS.

Circular Motion. A body in motion, which is continually impelled by some power toward a fixed point out of its original direction, is obliged to describe a curvilinear path round this point. A stone slung round by a string moves in a circle, because it is drawn toward the hand in every point of its path. The moon moves in a circle round the earth, because it gravitates toward the earth, and is thus drawn from the rectilinear direction which it would otherwise pursue. In such cases the point to which the body constantly tends is called the centre of the forces; the force itself, by which it is impelled, is called the centripetal force; that by which it strives to fly from the centre is called the centrifugal force; and the motion which is produced by these two forces, the circular motion. All the planets in the solar system are carried round the sun, and the satellites round their planets, by these forces. (See CENTRAL FORCES.) The theory of circular motion is a subject of celestial mechanics, on which Newton composed his 'Philosophiæ Naturalis Principia Mathematica'; and Laplace, his 'Mecanique Celeste,' etc.

Cir'cular Notes, in commerce, notes or letters of credit furnished by bankers to persons about to travel abroad. Along with the notes the traveler receives a "letter of indication" bearing the names of certain foreign bankers who will cash such notes on presentation, in which letter the traveler must write his name. On presentation the foreign banker can demand to see the letter of indication, and by causing the presenter to write his name, can compare the signature thus made with that in the letter, and so far satisfy himself as to the identity of the person presenting the note.

Circular Numbers, numbers whose powers end on the same figure as they do themselves: such are numbers ending in 0, 1, 5, 6.

Circular Parts, Napier's Rule for, a rule invented by Baron Napier of Merchiston, near Edinburgh, for the solution of all cases of right-angled spherical triangles, eminent for its comprehensiveness and utility in extensive surveys, navigation and practical astronomy. See TRIGONOMETRY.

Circular Polarization of Light. Plane-polarized light is altered into circularly polarized light by passing in a particular direction through a Fresnel's rhomb. This is a parallelopiped of glass with its faces set at certain angles depending on the refractive power of the glass. The light entering one base of the rhomb is twice internally reflected before it emerges at the opposite base; and while common unpolarized light passes through the rhomb without suffering alteration plane-polarized light has its properties in general completely altered. The final result depends on the inclination of the plane of polarization of the incident light to the plane of the internal reflections. In two cases, namely, when this angle is 0° or 90°, the emerging light is still plane polarized; when the angle is 45° the light is circularly polarized; in every other case it is elliptically polarized. In the first case, as will be understood from consulting the article on POLARIZATION OF LIGHT, the analyzer, on being applied to test the beam, shows in one position bright light, and on being turned round the principal axis through 90°, total darkness. In the last case — that of elliptic polarization — the analyzer shows, on being turned round, a beam of varying intensity, but never complete extinction. In the case of circularly polarized light the analyzer, on being turned round, shows a beam of the same intensity in every position of the analyzer, and, in fact, does not at first sight differ from ordinary unpolarized light. When, however, it is examined — not with a Nichol's prism direct, but after a second Fresnel's rhomb has been interposed — it is found to differ very remarkably from unpolarized light. The latter is, as we have remarked, unaffected by the rhomb; the circularly polarized light emerges from the second rhomb plane polarized. It is thus shown how to produce and how to recognize circularly polarized light. We now give a few of its most remarkable properties.

The light as we have said, that emerges from the second Fresnel's rhomb is again plane polarized, but it does not emerge precisely as it entered. For, except in one particular position of the two Fresnel's rhombs, the light that emerges from the second rhomb has its plane of polarization changed; the plane is turned round, in fact, through an angle depending on the positions of the two rhombs with regard to the original plane of polarization; and it may be turned round either in a right-handed direction, as it is called (see below), or in a left-handed direction. We might arrange a set of pairs of Fresnel's rhombs, it is evident, in such positions that each pair should give the plane of polariza-

tion of the ray passing through it a farther twist in the same direction, and we might turn it thus through any angle whatever. Such a power as we have imagined in a set of Fresnel's rhombs is possessed by quartz and by a considerable number of solutions of organic bodies, and it is known as a power of rotating the plane of polarization. When a beam of homogeneous light has passed through the polarizer, and the analyzer is placed in the position of total extinction of the ray (see POLARIZATION OF LIGHT), on introducing a plate of quartz the light reappears; but on turning the analyzer round, either in a right-handed direction or in a left-handed direction (whence the names), extinction is again obtained. Quartz is named right-handed quartz or left-handed quartz according to the direction in which the analyzer must be turned. The amount of the angle through which it must be turned depends on the thickness of the plate of quartz.

If, instead of using homogeneous light, as we have been supposing, plane-polarized white light is employed, it is found that the different rays are differently deviated. The effect on the more refrangible rays is greater than on the less refrangible, and the plane of polarization of the blue rays will thus be turned through a greater angle than that of the red rays. It will be perceived from this, that having arranged the polarizer and analyzer, and inserted a plate of quartz, as described above, on rotating the analyzer in the direction, right-handed or left-handed, that corresponds to the nature of the plate of quartz, we shall not arrive at a position of total extinction, but we shall see a most beautiful play of colors changing in order from red to yellow, then to orange, green, and blue. These phenomena are among the most beautiful and most striking of all the marvelous phenomena of light.

It has been remarked above that certain organic liquids and solutions have this rotatory power. Among these may be mentioned turpentine, some essential oils, solutions of sugar, and solutions of tartaric acid. This fact is taken advantage of in Soleil's saccharometer (q.v.), an instrument for determining the value of cane-sugar in a liquid.

We have spoken above of the right-handed and left-handed properties of quartz; a discovery of Haüy leads us here to the very threshold of the molecular structure of crystals. We may yet hope for discoveries in this direction. On comparing crystals of quartz that give us right-handed and left-handed polarization, it is found that a very remarkable property connects their forms. The crystals that give right-handed and left-handed polarization are of an unsymmetrical construction, such that either viewed in a looking-glass gives an image of the same form as the other. Pasteur, examining the crystals of the two varieties of tartaric acid whose solutions have opposite rotational powers, but whose chemical properties are very nearly the same, showed that the same law holds for them; and, having crystallized what is known as neutral tartaric acid, was able, by picking out the crystals by hand, to separate it into equal portions of lævo tartaric acid and dextro tartaric acid. But we must refer the reader to the special articles on the chemistry of this substance.

One of Faraday's most brilliant discoveries was the rotatory power of glass under the action of a powerful magnet. The reader is referred for an account of it to the article POLARIZED LIGHT.

Circular Sailing. See GREAT CIRCLE SAILING.

Cir'culating Library. See LIBRARIES.

Circulation, in animals, the passage of blood in circuit through the body; in vegetables, a similar circuit of sap.

Circulation of the Blood.— This process is widely distributed throughout the animal kingdom, even the irregular movement of blood in the lowest animals being termed a circulation. Properly speaking, however, only fishes, birds, and mammals may be said to have a distinct circulation. In the lower animals, such as the lobster or crab, there is no continuous vascular system, the arteries ending in lymph spaces. In birds and mammals, however, a particle of blood starting at any given point in the system makes a complete circuit and repasses its point of starting.

History.— In the chapter on anatomy the point was reached where the important discoveries of Harvey had revealed the secret of the circulation and that the study of human physiology was set on a secure basis, but in the matter of the circulation all the credit of discovery is not due to Harvey alone. It will be recalled that the authority of Galen persisted for over 1,000 years, and that the opening of the 16th century found a number of enthusiastic anatomists who founded a school of their own, and the new Vesalian anatomy replaced the old Galenic anatomy, but unfortunately not Galen's physiology. The old doctrine of Galen as applied to the circulation may be summed up as follows (Foster, 'History of Physiology'):

"The parts of the food absorbed from the alimentary canal are carried by the portal vein to the liver, and by the influence of that great organ are converted into blood. The blood thus enriched by the food is by the same great organ endued with the nutritive properties summed up in the phrase 'natural spirits.' But blood thus endowed with natural spirits is still crude blood, unfitted for the higher purposes of the blood in the body. Carried from the liver by the vena cava to the right side of the heart, some of it passes from the right ventricle through innumerable invisible pores in the septum to the left ventricle. As the heart expands it draws from the lungs, through the vein-like artery (or, as we now call it, the pulmonary vein), air into the left ventricle. And in that left cavity the blood which has come through the septum is mixed with the air thus drawn in, and by the help of that heat which is innate in the heart, which was placed there as the source of the heat of the body by God in the beginning of life, and which remains there until death, is imbued with further qualities, is laden with vital spirits and so fitted for its higher duties. The air thus drawn into the left heart by the pulmonary vein, at the same time tempers the innate heat of the heart and prevents it from becoming excessive. Thus from the right side of the heart there is sent to the body generally along the great veins, and to the lungs along the artery-like vein (the pulmonary artery), a flow, followed by an ebb, of crude blood endued with natural spirits only, blood serving the lower stages of nutrition. Blood flows through the artery-like vein to the lungs for the nourishment of the lungs, just as it flows through the other veins for the nourishment of the rest of the body; in both cases there is an ebb as well as a flow along the same channel. From the left side, on the other hand, there takes place along the arteries to all parts of the body a flow, followed also by an ebb, of blood endued with vital spirits, and so capable of giving power to the several tissues to exercise their vital functions. As this blood passes from the left heart along the vein-like artery to the lungs, it carries with it the various fuliginous vapors which, in the fermenting activity giving rise to the vital spirits, have been extracted from the crude blood,

and discharges these vapors into the pulmonary passages. Arterial blood, that is, blood laden with vital spirits, reaching the brain, there generates the animal spirits, which, pure and unmixed with blood, existing apart from blood, are carried along the nerves to bring about movements and to carry on the higher functions of the body."

This is the outline of the crude Galenic doctrine, and Vesalius, brilliant anatomist that he was, was content to accept it, although there are evidences that he was very skeptical regarding much of Galen's physiological teaching. It was particularly from the anatomical side that he was most skeptical; namely, the lack of tangible holes between the two sides of the heart, which were so important to the Galenists. His skepticism was taken up by his pupils, and was also felt by others, one of them, Michael Servetus, who published a remarkable book, the 'Restitutio Christianismi,' in which a much truer conception of the circulation of the blood was taught. This was as early as 1553. He rejected entirely the ancient doctrines, and had grasped the true doctrine of the pulmonary circulation, the passage of the blood from the right side through the lungs to the left side. Servetus, however, was a theologian more than a physician, and his early death probably prevented his further studies. Realdus Columbus, of Cremona, must be regarded as another link in the chain that led up to the final solution. He is thought to have been a tricky man, however, and one who would not hesitate to poach on another's preserves, and there are indications of his copying much from Vesalius' works and claiming them as his own. He was vain and ignorant, but in his book, 'De Re Anatomica' (1559), he described correctly the pulmonary circulation, but he was unable to draw from it the lessons that it implied. This, by many historians, is taken as evidence that he was only a copier, and that probably the work of Servetus had been seen by him and he had claimed the discovery as his own. Cæsalpinus, a noted botanist, was the first to appreciate the fact that at the contraction of the ventricles (systole) the blood was thrown into the aorta and into the pulmonary artery, and at its diastole it received the blood from the vena cava and the pulmonary vein. He also seemed to have grasped the fact of the flow of the blood from the arteries to the veins, and of the flow along the veins to the heart. This was in 1571 and 1593. Thus Cæsalpinus had a true suggestion of the idea both of the pulmonary and systemic circulations. But Cæsalpinus' work seems to have been lost sight of, and another, Hieronymus Fabricius, had the honor to open the next door that led to Harvey's triumph. Fabricius called renewed attention to the valves in the veins, but missed their real function, and, although he was Harvey's teacher, he was more of a Galenist than a modern.

It is to William Harvey's credit, not so much that he was the discoverer of the physiology of circulation,— this, it can be seen from this brief recital, was of gradual accretion,— but that he was the first demonstrator of the process. He was the first physiological experimenter, and his work on the living animal has opened up to the world most of its priceless gifts in the field of medicine. It was by the faithful and prolonged study of many hearts of many animals that showed him that —

"the motion of the heart consists in a certain universal tension, both of contraction in the line of its fibres, and constriction in every sense, that when the heart contracts it is emptied, that the motion which is in general regarded as the diastole of the heart is in truth its systole";

— that the true work of the heart is not that it sucked blood in, but that it drove blood out. Cæsalpinus guessed at this, or may be knew it, but Harvey proved it, and, what is more, read the consequences. He saw clearly, then, the real function of the auricles and the ventricles and of their valves, and he applied the lessons of the lesser, or pulmonary circulation, to the greater, or systemic circulation, and thus rounded out the true natural history of the process. In his own words:

"I frequently and seriously bethought me, and long revolved in my mind, what might be the quantity of blood which was transmitted, in how short a time its passage might be effected, and the like; and, not finding it possible that this could be supplied by the juices of the ingested aliment without the veins on the one hand becoming drained, and the arteries on the other hand becoming ruptured through the excessive charge of blood, unless the blood should somehow find its way from the arteries into the veins, and so return to the right side of the heart, I began to think might there not be *a motion, as it were in a circle.* Now this I afterward found to be true; and I finally saw that the blood, forced by the action of the left ventricle into the arteries, was distributed to the body at large, and its several parts, in the same manner as it is sent to the lungs, impelled by the right ventricle into the pulmonary artery, and that it then passed through the veins and along the vena cava, and so round to the left ventricle in the manner already indicated, which motion we may be allowed to call circular."

Thus clearly and forcefully he set forth in 1616 — although his work did not appear until 1628 — the true doctrine, and it is of interest to record that he lived to see it adopted practically by all scientists. Malphigi, in 1661, demonstrated, by means of the microscope, the capillaries, thus filling out the last link in the chain of evidence.

Mechanics of Circulation.— Harvey's work established the mechanical character of the heart's action, and, as it is now regarded, the heart is the pump which beats about 72 times a minute, thus forcing the blood with considerable velocity and force through the arteries. It is a double pump, as it were, both sides working simultaneously, the pulse-beat being the wave of the systolic contraction of the left ventricle. Each half of the heart consists of a smaller, less muscular portion, the auricles, and a larger, stronger portion, the ventricles, the left ventricle being much more powerful than the right. Leading into the heart and away from it are the aorta, pulmonary vessels, artery, and vein, and the vena cava. Between the auricles and ventricles are valves,— the mitral between the left auricle and left ventricle; the tricuspid corresponding on the right side; and the pulmonary and aortic valves. Starting with the spent blood that is collected from the entire body in the veins, this is carried, by pressure of the walls of the veins, through the vena cava, and emptied into the right auricle; this contracts, the valve at the orifice of the vena cava closes, the tricuspid valve opens, and the blood is forced into the right ventricle. It remains here a small fraction of a second, and this ventricle contracts, the tricuspid valve closes, and the blood is forced through the pulmonary artery into the lungs. Here it is spread out, mesh-like, in millions of capillaries, is oxygenated, and brought back to the left auricle by the pulmonary vein. The contraction of the left auricle forces the blood into the left ven-

tricle through the mitral orifice, the valves behind closing, and finally the great throb of the heart is caused by the ventricular systole, the mitral valve closes tight, preventing regurgitation, and the blood bounds out into the arteries, the aortic semilunar valves closing as soon as the ventricle commences to expand to get its next supply. Thus this cycle goes on 72 times a minute on the average, night and day, until death quiets the heart's action. In actual operation the right and left sides are working simultaneously, and when one listens to the heart-beat one hears only the "lub-dup," "lub-dup," of the closing auriculo-ventricular valves, and the closing aortic and pulmonary tricuspids. From the arteries the blood goes to every structure in the body in the capillaries, and returns in the veins, whose valves prevent venous congestion, and once more into the vena cava. The whole cycle is complete in about 22 seconds, one thirteenth of the entire weight of the body in blood has been thus sent round the circuit, with an initial force of the ventricular contractions of about 4.5 foot pounds at an initial velocity of about 20 inches a second. In 24 hours thus the heart's energy would lift 124 tons in weight one foot. The vital or nervous mechanism that keeps the heart in motion consists in the main of three factors, the irritability of the heart muscle itself, the action of the cardiac nervous ganglia of the sympathetic, and the cardiac regulator nerve, the pneumogastric. If a salt solution of 0.6 per-centage composition is passed through the fresh heart of many of the lower animals, the heart will commence to beat, thus showing that if the heart muscle is supplied with proper liquid it must beat, hence the irritability of the heart muscle is the first and most important factor in the phenomenon of circulation. The blood salts, notably calcium and potassium, supply the irritant, and muscular contraction results, but if the heart muscle alone is beating it does so rhythmically, but the different parts do not work in efficient unison, hence the need of a regulating mechanism other than the auricle "pace-maker." This is supplied by the cardiac ganglia, their irritation causes the heart to beat more rapidly, but not in unison. The chief regulator and steadier of the heart-beat, as well as the great trophic nerve, is the tenth nerve, the pneumogastric or vagus, coming from the medulla. This nerve brings complete order and system into the heart mechanism as adjusted to other conditions in the body. Its stimulation slows the action of the heart; its paralysis causes the heart to run away, given over to the ganglia and the muscle. Another important feature in the circulation is the elasticity of the blood vessels, or vessel tone. This is maintained by the sympathetic nervous system, which raises or lowers vessel tone in accordance with the needs of the cells of the body. A regular condition of blood-vessel tonus is essential to the life of the cells of the body, muscular as well as nervous.

Circulation in the Lower Animal Forms.— The motion of a limpid fluid can be rendered perceptible only by the presence of the corpuscles which it carries. In the blood it is rendered apparent in the capillary vessels by means of its globules. In infusorial animalcules the movement of the fluids of the body is maintained by that of the animal itself and by the disturbing influence of nutritive absorption. In the *Polypi* the movement receives aid besides from the action of cilia on the inner walls of the body. The *annelids*, as the earth-worm, possess contractile vessels traversing the length of the body. The insects, crustaceans, myriapods, and spiders have a dorsal tube which in the common crab and the spider is much shortened and broadened, but in the others remains tubular, the blood regaining its cavity through slits in the sides as well as by the openings of the trunks which the heart gives off. In these animals the circulation is incomplete, that is, the blood does not flow through canals with definite walls, but in the interstices of the tissues. The *Mollusca* have the heart provided with an auricle and a ventricle, as in the snail and whelk; two auricles, one on either side of the ventricle, as in the fresh-water mussel, or two auricles and two ventricles as in the ark shells. Among the ascidians, which stand low in that division of animals to which the mollusks belong, the remarkable phenomenon is encountered of an alternating current, which is rhythmically propelled for equal periods in opposite directions. All vertebrated animals (except *Amphioxus*) have a heart which in most fishes consists of an auricle and ventricle, but in the mud-fishes (*Lepidosiren*) there are two auricles and one ventricle; and this trilocular heart is found in the amphibians, and in most reptiles except the crocodiles, which, like birds and mammals, have a four-chambered organ consisting of two auricles and two ventricles. In these two last-named classes the venous and arterial blood are kept apart; in the trilocular hearts the two currents are mixed in the ventricle.

Consult Schaëfer, 'Physiology'; Tigerstedt, 'Physiologie des Kreislaufes'; Foster, 'Lectures on the History of Physiology.'

See ANATOMY, HISTORY OF; BLOOD PRESSURE; ENDOCARDITIS; HEART.

SMITH ELY JELLIFFE,
Editor 'Journal. Nervous and Mental Disease.'

Circulation in Plants. See SAP.

Circumcellions, sĕr-kŭm-sĕl'ĭ-ŏnz, **Circumcellio'nes,** or **Circelliones,** members of bands probably of fanatic monks, partisans of Donatus (q.v.) and the Donatists in Numidia and Mauretania who, avenging the condemnation of Donatus by the Synod of Arles (314) and the Council of Nicæa (325) and the condemnation of Donatus and his followers by Constantine and Constantius, roamed throughout those provinces pillaging and wrecking the churches and other religious establishments of the Roman Catholics and proclaiming the downfall of the empire itself. Their name probably is formed from *circum,* round about, and *cella,* cell, a monk's cell: if the derivation is correct these Circumcellions are of the same class of vagabond monks complained of by the father of western monachism, St. Benedict as *gyrovagi,* circulating vagabonds.

Circumcision, an amputation of a portion of the human organs of generation; principally performed on males, but sometimes on females. It has been practised in all ages, and by both civilized and savage races, as Arabs, certain African tribes, Christian Abyssinians, Australian "blacks," Malays, some North American Indians, Aztecs, Mayas, Caribs, South American Indians, Jews, Mohammedans, Fijians, and Samoans.

In the male, the operation consists in removing a section of the prepuce. Doubtless the original object was cleanliness, a safeguard against venereal infection, or the moderation of the sexual passion, which are said to be results of the operation, but among the Jews it has always been a religious rite, for they regard it as the sign of the covenant made by Jahwé with Abraham and his posterity. The institution of the rite is recorded in Gen. xvii. Here it is stated that Abraham, then 99 years old, was himself circumcised, with his son Ishmael, 13 years old, "and all that were born in his house, and all that were bought with his money, every male among the men of Abraham's house." But by the terms of the covenant every man-child among the Hebrews was to be circumcised on the eighth day after birth, and this rule, peculiar to the race, is adhered to with such rigor that even the Sabbath observances are not allowed to interfere with the ceremony. Other Eastern nations have practised circumcision on various days,—the Arabs 7, 14, 21, or 28 days after birth, though Josephus states that in his day the Arabs circumcised after the age of 13 on account of the circumcision of Ishmael, their progenitor, taking place at that age; the Mohammedans of Persia circumcise in the third or fourth year; Fijians and Samoans in the seventh year; the Christian Abyssinians in the sixth, seventh, or eighth year; while some of the African tribes that practise the rite follow the Jewish rule; others, again, performing the ceremony between 30 and 60 days after birth.

Circumcision is universally practised by Mohammedans, not on the authority of the Koran, which does not enjoin it, but as following the example of Mohammed. It seems to be doubtful whether Mohammed's omission to prescribe the rite was due to his deeming such a rule valueless where custom already decreed it, or because he attached only a physiological and not a religious importance to the ceremony. It is, however, now recognized as a religious obligation just as strongly as if it had been ordained by the founder of Islam. Circumcision among Mohammedans may be practised seven days after birth, but it is customary to postpone the ceremony to some time between the 7th and 12th year.

Christianity recognizes no religious significance in the rite, substituting for it, according to St. Paul (Rom. ii. 25–29) "circumcision of the heart." The Church, however, celebrates as a festival the first of January, as being the day of the circumcision of its founder.

Circumcision of proselytes to the Jewish or Mohammedan faith is insisted on by the orthodox, and previous circumcision for surgical reasons is not accepted as sufficient compliance with the requirements of religion. Among some "reformed" Jews, however, the circumcision of adults has lately been abandoned. Among many savage tribes the rite is undergone at the age of puberty, and is perhaps in such instances more of a sociological than a religious ceremony, being akin to other mystic rites which mark the entrance of the young into full tribal fellowship.

The circumcision of women is effected by the removal of a portion or the whole of the clitoris. It is perhaps practised more in Arabia than elsewhere, but has never prevailed among Jews.

Circumcision is much favored by physicians and surgeons of the present day as a hygienic measure irrespective of any religious associations.

ELFORD E. TREFFRY.

Circum'ference, or **Periphery,** the curve which encloses a circle, ellipse, or other plane figure. In figures bounded by straight lines, as the triangle, square, and polygon, the term perimeter is employed to designate the sum of all the bounding lines taken together. The length of the circumference depends partly on the nature of the curve; thus, that of the circle $= 2\pi r = \pi d$ and that of the ellipse

$$= 2\pi a \left\{ 1 - \left(\frac{1}{2}\right)^2 \frac{e^2}{1} - \left(\frac{1.3}{2.4}\right)^2 \frac{e^4}{3} - \left(\frac{1.3.5}{2.4.6}\right)^2 \frac{e^6}{5} \right\} \text{ etc.}$$

where a is the semi-axis major, and e the eccentricity.

Cir'cumflex, in grammar, one of the three accents, formed by the union of the other two, thus, ^, ~. It originally denoted a rising and falling of the tone in the pronunciation of the syllable. It is not used in English, and in French is usually a sign of the elision of a letter, and therefore indicates a prolonged sound.

Cir"cumlocu'tion Office, a name used by Dickens, in 'Little Dorrit'; he applies it to the delay and slowness of British officialism and especially when dealing with poor and friendless persons, imprisoned for petty offenses.

Cir"cumnuta'tion, the continuous motion of every growing part of a plant, in which it describes irregular elliptical or oval figures. The apex of the stem, for instance, after pointing in one direction, moves round till it points in the opposite direction, and so on continuously. The term circumnutation was first used by Darwin.

Circumpo'lar Stars, stars near the Pole that appear to move around it, and perform their circles without setting. A star whose polar distance is less than the latitude of a place will never set at that place. They are constantly used by astronomers in connection with meridian work for determining the correction to be applied to transit observations to free them from the errors due to the slight departure of the line of collimation of the instrument from the plane of the meridian as it revolves on its axis. The pole-star Polaris or Alpha Ursæ Minoris, usually known as the North Star, is the most used for that purpose.

Circumstantial Evidence, evidence which tends to prove a particular fact by the proof of other facts, from which it is concluded that the particular fact must have happened. It is the natural and reasonable inference resulting from facts which have been established.

If A is on trial for the murder of B, and a witness testifies that he saw A shoot B, and a few minutes later B died, that would be direct evidence; whereas if the witness testified that B had been shot, and the bullet found in the body of B was of a particular make only used by A, and that A was in the neighborhood at the time of the shooting, the jury might infer that A was guilty; but if A could

prove that his pistol had been stolen from him shortly before the shooting, and he had not recovered it at the time of the shooting, it would be a complete defense, and the verdict would depend on the credibility of the witnesses.

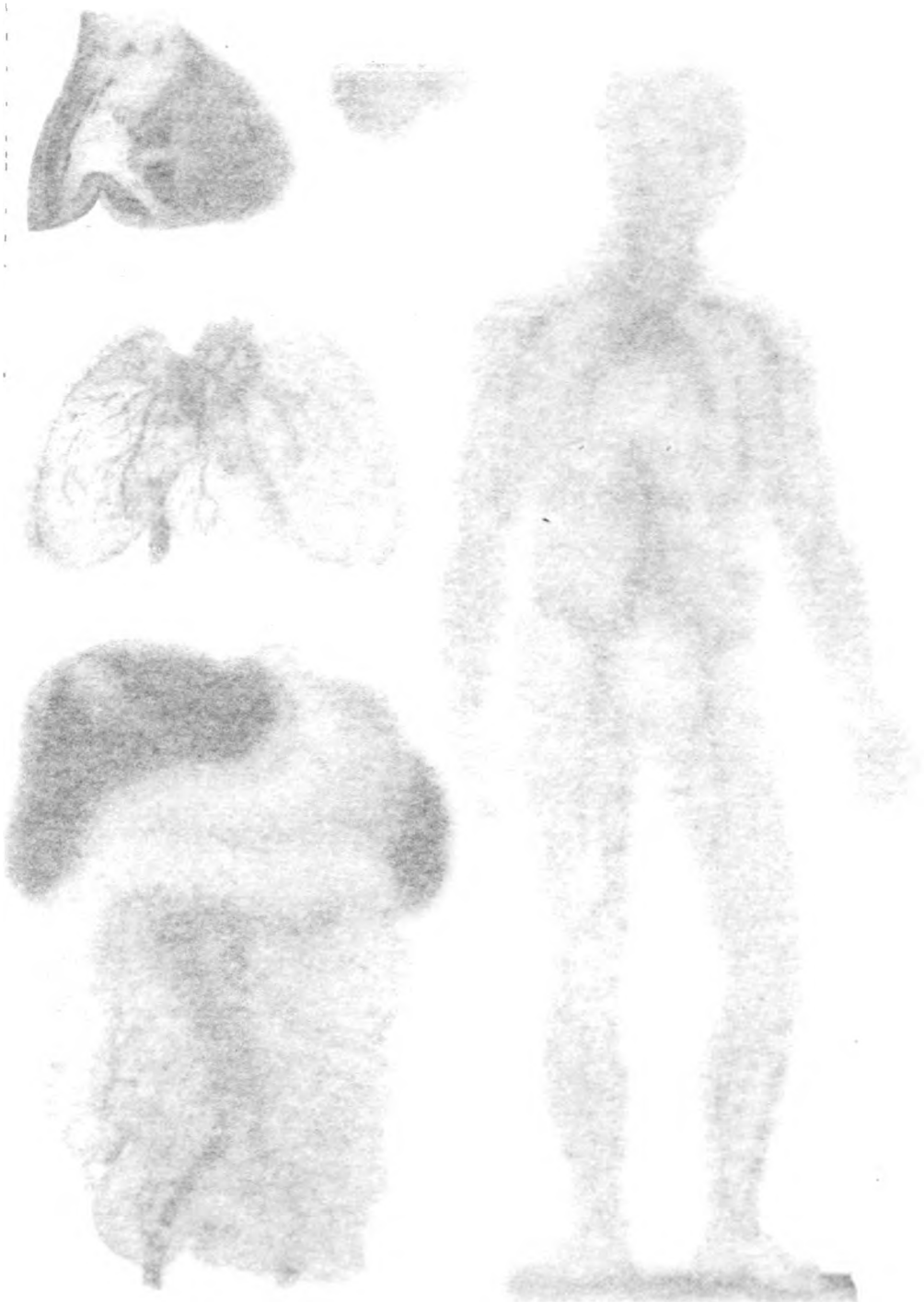
Circumstantial evidence is of two kinds: that from which a certain conclusion necessarily follows, and that from which a certain conclusion is only probable or likely. If the body of a man is found with a bloody right hand impression on a part of his body where it is impossible for him to put his right hand, the presumption is that some one was present at or since the time the person was hurt; but if that is all of the evidence, it is impossible to tell whether the bloody impression was made by the person at the time of the assault, or by some one after the assault had been committed. In civil cases the jury may decide according to the weight of the evidence; but to convict a person of a crime the evidence must be such as to leave no reasonable doubt as to his innocence. See LAW, CRIMINAL.

Cir"cumvalla'tion, a fortification consisting of a parapet of earth and a trench, constructed by a besieging army around its camp, to guard against attempts to relieve the place besieged.

Circus, a word which has come down to us from the Latin without change, meaning "circle," and used by the Romans to indicate the place in each city where chariot races, gladiatorial contests, and feats of skill were held. The circus building in Roman times was without a roof, rectangular in shape, except that one short side formed a half-circle; on both sides, and on the semicircular end, were the seats of the spectators, rising gradually one above another, like steps. The largest of these buildings in Rome was the Circus Maximus, 1,875 feet long and 625 feet wide, and capable, according to Pliny, of containing 260,000 spectators. At present, however, but few vestiges of it remain, and the circus of Caracalla is in the best preservation. Grown great through conquest of other peoples, the Romans of 2,500 years ago (and for 10 centuries later) encouraged all forms of pleasure which would develop to its highest pitch the fighting instinct in their soldiery. Among the circus games were chariot races, a favorite sport of the Romans; athletic contests; the Trojan games, contests on horseback; and combats with wild beasts in which beasts fought beasts, or beasts with men (either criminals or volunteers). The prizes given to the victors were often valuable, and the honors great. In the decadence of Rome came a decline of the circus, and it was frequently debased by revolting spectacles, in which Christians or others temporarily hated by the government were given over to wild beasts, or crucified. Julius Cæsar dug ditches around the circus and filled them with water. This served the double purpose of protecting the spectators from the sudden swerving of a chariot or spring of a tiger, and of making possible the novelty of feats of skill on the water. Most of the vessels then were propelled entirely by banks of oars, and Cæsar held rowing-races, swimming-races, etc. Most of our grotesque picnic-games, like swimming in a barrel or running in a sack, are relics of his fertile inventions to please his restless, turbulent people. There was no charge to see these entertainments, as a rule, the circus being used as a pacifier by the emperor.

America has taken the lead in the reproduction of the Circus Maximus. This is probably because the American people are of a similar strenuous, contest-loving, restless disposition. It was his acute perception of this disposition in his countrymen that led Phineas Taylor Barnum (q.v.) a Connecticut Yankee, to devote his life to entertaining his countrymen by giving them a real circus. He first started the American Museum at the corner of Broadway and Ann street, New York, a site now occupied by the 20-story St. Paul Building. Soon he began to exploit all kinds of freaks and curious human beings, "Tom Thumb" and other dwarfs being among his features. He saw the greed of the public for odd, grotesque things. "The public loves to be humbugged," was one of his frequent declarations. Yet Barnum always gave the people what he promised, and soon had on the road the beginning of what has since become perhaps the largest "show" on earth. Since Barnum's death, the circus has been directed by Mr. Bailey, his partner for some years previous to that event. The magnitude of the Barnum & Bailey circus and menagerie can scarcely be described. It is usually formed by making three immense rings, three different performances being given simultaneously. With 1,000 performing horses, 2,000 horses to haul the tents and equipment from town to town, hundreds of wild beasts in a menagerie, 500 performers, bare-back riders (both sexes), clowns, aërialists, tumblers, etc.— 1,200 other employees to care for the animals and erect the tents (seating 25,000), put up show-bills, etc., advance agents, cashiers, managers, and other attachés, bringing up the total to about 3,000 people employed during the season, the conducting of such a circus requires consummate ability and great pecuniary resources. A dozen trains of cars are necessary to carry this exhibition, and a whole ship is used when it visits Europe, as it often does, successfully. The capital invested in this and other circuses in America is enormous, being not under $100,000,000. There are 8 or 10 of the very large circuses, and 20 more smaller ones at work in America at present (1903). The admission price to the common seats was primarily fixed by Barnum at 50 cents, and this has never been varied from since. The better seats, near the centre, are $1.00. These seats correspond to those of the Roman emperor and his court in the old Circus Maximus. Vast crowds attend these exhibitions, particularly in the rural districts, where "circus day" is as much of a holiday as 4th July. Unless a continuous season of rainy weather is encountered, the profits accruing to the proprietors of these circuses at the end of the season (about October) are usually 100 per cent or more.

Since about 1890 there has developed a peculiar American form of circus which is worthy of mention. This is a reproduction in the ring of the habits and customs of the "cowboy" and pioneer of our own western plains. The exhibition is termed a "Wild West" show. It was originated, practically, by William F. Cody (q.v.), known on the plains as "Buffalo Bill."



...ible inventions to please ... people. Little was ... ments, as a rule, ... pacified by the ... has taken the lead in ... Circus. Mr. ... the American people ... contests, combat ... It was his ... countrymen that led ... Barnum enjoyed a ... way to entertain ... by giving them a real ... the American Museum at ... way and Ann street, New ... occupied by the 20-story ... Soon he began to exploit all kinds of ... and curi us human beings. "Tom Thumb" other dwarfs being ... his features. He saw the greed of the ... for odd, grotesque things. "The public likes to be humbugged" was one of his frequent declarations. Yet Barnum always gave the people what he promised, and soon had on ... of the ... of what has since become ... perhaps the ... "show" on earth. Since Barnum's death, the circus has been directed by Mr. Bailey, his partner for some years previous to that event. The magnitude of the Barnum & Bailey circus and menagerie can scarcely be described. It is usually formed by making three immense rings, three different performances being given simultaneously. With 1,000 performing horses, 2,000 horses to haul the tents and equipment from town to town, hundreds of wild beasts in a menagerie, 500 performers, bare-back riders (both sexes), clowns, aerialists, tumblers, etc.—1,200 other employees to care for the animals and erect the tents (seating 25,000), put up show bills, etc., advance agents, cashiers, managers, and other attachés, bringing up the total to about 3,000 people employed during the season, the conducting of such a circus requires consummate ability and great pecuniary resources. A dozen trains of cars are necessary to carry this exhibition, and a whole ship is used when it visits Europe, as it often does, successfully. The capital invested in this and other circuses in America is enormous, being not under $100,000,000. There are 8 or 10 of the very large circuses, and 20 more smaller ones at work in America at present (1903). The admission price to the common seats was primarily fixed by Barnum at 50 cents, and this has never been varied from since. The better seats, near the centre, are $1.00. These seats correspond to those of the Roman emperor and his court in the old Circus Maximus. Vast crowds attend these exhibitions, particularly in the rural districts, where "circus day" is as much of a holiday as 4th July. Unless a continuous season of rainy weather is encountered, the profits accruing to the proprietors of these circuses at the end of the season (about October) are usually 100 per cent or more.

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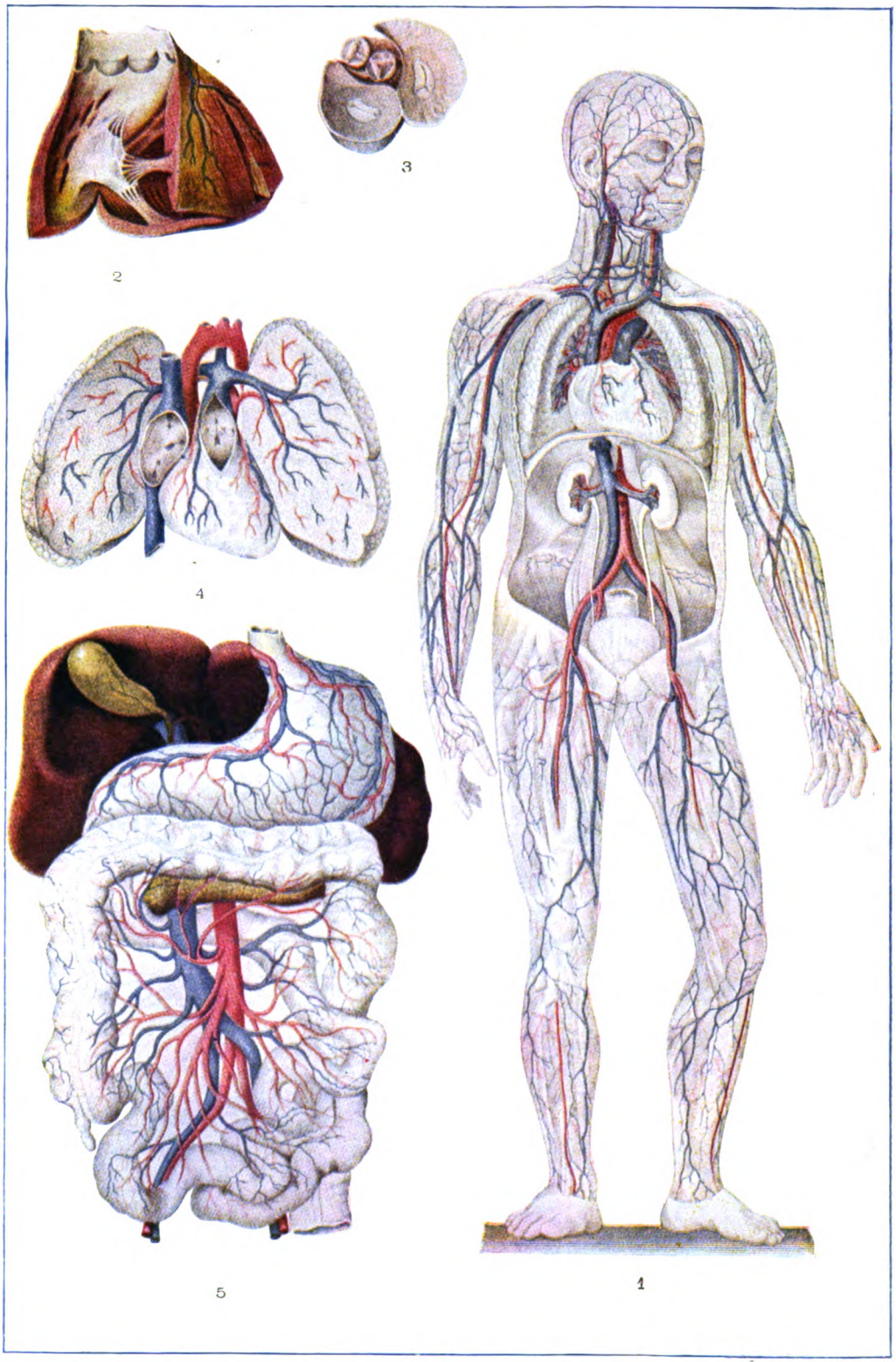

[The red lines show arteries; the blue, veins.]

1. General Circulation in the Human Body.
2. The Heart, showing Interior.
3. Cross-Section of the Heart, seen from above.
4. Circulation of Blood in the Lungs
5. Circulation of Blood in Digestive Tract.

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He was a former government scout, and thus became familiar with many Indian tribes. With the aid of "Nate" Salisbury he organized an exhibition of frontier and Indian life which rivals Barnum & Bailey's in point of interest and profit. He has a hundred western cattle-herders, who give marvelous illustrations of the perfect horsemanship of the plains; he has many American Indians from a score of tribes, who give their war-dances and weird chants; he has Mexican lariat-throwers, who perform wonderful feats with a swirling rope; he has "rough riders" from many lands. Altogether, this makes a "show" which appeals powerfully to both the young and the old American. Several less important "Wild Wests" have also been organized.

Some American college youth have recently endeavored to revive interest in the ancient Grecian Olympic games. A delegation of them went to Athens in 1902 to compete with the modern Greeks and other national champions. These efforts may eventually rehabilitate the hippodrome and Circus Maximus in the lands which gave them birth.

Cirencester, sĭs'ĕ-tẽr, England, a town in the county of Gloucester, on the river Churn, 18 miles southeast of the city of Gloucester. The chief industries are malting, brewing, and cutlery manufacture; it also has a large wool trade. The town contains the remains of the gateway of an abbey founded in 1177; and several churches of interest. In the environs is the well-known Royal Agricultural College, with a large number of students coming from all parts of the world. Cirencester was founded by the ancient Britons, and later, under the name of Corinium, became a Roman station. Various Roman remains, including those of an amphitheatre, have been discovered in it, and numerous relics belonging to this period of its history have from time to time been found and placed in the local museum. It was the scene of engagements during the civil war of the 17th century. Pop. (1901) 7,530.

Cirillo, Domenico, dō-mā-nē'ko chē-rēl'lo, Italian republican and naturalist: b. Grugno, Naples, 1734; d. Naples August 1799. He officiated in early life as professor of botany, afterward accompanied Lady Walpole to France and England, became a Fellow of the royal society of London, a friend of Buffon, D'Alembert, and Diderot, and on his return to Naples was appointed physician of the court. After the proclamation of the republic by the French, he was chosen representative of the Neapolitan people, and member of the legislative commission (1799); and on the re-establishment of royalty suffered death on the scaffold, rather than take the oath of allegiance or ask a pardon from King Ferdinand. His principal writings are: 'Fundamenta Botanica' (1787); and 'Entomologiæ Neapolitanæ Specimen' (1787); folio.

Cirl-Bunting, sêrl'bun'tĭng, a small and very handsome European bunting (*Emberiza cirlus*), rare and local in England, often kept as a cage-bird, though its song is slight.

Cirpan, cher'pàn, a town of eastern Rumelia, Bulgaria, on the tributary of the Maritza, 30 miles east of Philippopolis. It is situated in a fertile, fruit-producing region and is noted for its mineral springs. Pop. 11,069.

Cirque, sêrk, the name applied to basins occurring in mountainous regions at the head of narrow stream valleys and gorges. They are characterized by precipitous walls, which curve around in a semicircle, forming a natural amphitheatre. Their origin may be traced to the erosive action of converging glaciers and streamlets.

Cirrhosis, sĭ-rō'sĭs, a process of chronic, inflammatory reaction in an organ, due to some form of constant irritation. It is characterized by the excessive production of connective tissue in the part, which increase of connective tissue gradually encroaches upon the blood-vessels of the organ and slowly invades its essential portions. Cirrhosis may occur in almost any portion of the body, but it is characteristically present in only those organs which are rich in functionating parenchyma, such as the kidney, liver, spleen, pancreas, and brain. In each of these organs it produces a very definite form of lesion, with a clearly defined clinical course and history. Thus, in the kidneys, cirrhosis constitutes one of the forms of Bright's disease or chronic nephritis (q.v.). Cirrhosis of the liver results in a well-defined form of liver-disease, or chronic cirrhotic hepatitis (q.v.). Cirrhosis of the spleen, and cirrhosis of the pancreas also occur, and there is a well-known form of cirrhosis of the brain associated with degeneration. (See GENERAL PARESIS.) These different forms of cirrhosis will be discussed under their separate headings.

Cirripe'dia, an order of entomostracous *Crustacea* (barnacles), sometimes ranked as a sub-class, always fixed in the adult stage, but with free-swimming larvæ having three pairs of appendages (*nauplius*) like other *Crustacea*. The typical barnacles have the body enclosed in a reduplication of the skin which secretes a calcareous shell, on which account they were classed with the *Mollusca* until the discovery of their free-swimming larvæ led to a closer investigation of their structure. Owing to adaptation to a sedentary life segmentation of the body has become obscure, and the six pairs of jointed biramous appendages are mere fringed scoops for creating currents in the water. The eyes and other sense organs have likewise degenerated, and most species are hermaphroditic. The barnacles are exclusively marine, and a great many are parasitic.

Four sub-orders are distinguished: (1) *Thoracica*, including the typical, free-living, shelled barnacles of which the sessile forms (*Balanidæ, Coronulidæ*, etc., are well known as rock and ship barnacles in which the animal is protected by a conical shell formed of several pieces, with a multivalve conical movable lid, having an opening through which several pairs of long, many-jointed, hairy appendages are thrust, thus creating a current which sets in toward the mouth. The young have oval bodies, with a single eye, a pair of antennæ, with three pairs of legs. After swimming about for some time it attaches itself by its antennæ to some object, and now a strange backward metamorphosis begins. The body becomes enclosed by two valves, the stalk by which it is anchored grows larger, the feet become more numerous, and eventually the barnacle shape is attained. The goose-barnacle (*Lepas*) is not sessile, but is flat and triangular, and attached to floating bits

of wood or seaweed by a long, large, soft stalk. (2) *Abdominalia,* parasitic barnacles, in which the sexes are separate and very unequal in size. In this group is presented the remarkable phenomenon of dwarfed complemental males discovered by Darwin. The females live in burrows in the shells of mollusks and other barnacles, while the males are minute, lack mouth, digestive canal, and appendages, and live, often several together, permanently attached to the female. (3) The *Apoda,* whose body is maggot-shaped, are hermaphrodite and parasitic in other barnacles. (4) *Rhizocephala:* This group presents perhaps the most extreme cases of degeneration, through parasitism, known among animals. *Sacculina,* which attaches itself to the abdomen of the crab, is little more than a bag of genital organs which draws its nourishment from the tissues of its host by means of branching root-like processes which penetrate to every part of its body. Consult Darwin, 'Monograph of Cirripedia.'

Cirrus. See CLOUD.

Cir'rus, in botany, the tendril by means of which certain plants climb, usually a modified leaf or the prolongation of a midrib.

Cirta, sĭr'tȧ, a city of northern Africa, the capital of the Numidian prince Syphax, and an important fortress of Masinissa and his successors. Later it became a flourishing Roman colony. It was much injured by the troops of Masentius in 310 A.D., but was restored by Constantine and named Constantina. The modern Constantine occupies its site.

Cisal'pine Republic, Italy, a former State in the northern part. After the battle of Lodi, May 1796, Gen. Bonaparte proceeded to organize two states — one on the south of the Po, the Cispadane Republic, and one on the north, the Transpadane. These two were on 9 July 1797, united into one under the title of the Cisalpine Republic, which embraced Lombardy, Mantua, Bergamo, Brescia, Cremona, Verona, and Rovigo, the duchy of Modena, the principalities of Massa and Cararra, and the three legations of Bologna, Ferrara, and the Romagna. The republic had an area of more than 16,000 square miles, and a population of 3,500,000. The seat of the government or Directory was Milan. The army consisted of 20,000 French troops, paid by the republic. The republic was dissolved for a time in 1799 by the victories of the Russians and Austrians, but was restored by Bonaparte after the victory of Marengo, and some modifications of constitution were made and the area was increased. In 1802 it took the name of the Italian Republic, and chose Bonaparte for its president. In 1805 the republic sent a deputation to Napoleon, with authority to give him the title of King of Italy. The territory was known as the kingdom of Italy until 1814. In 1815 it became a part of Austria. It is now a part of the Italian kingdom.

Cisco, sĭs kō, a local name, probably from the Indian language, applied to several species of fresh-water fishes of the family *Salmonidæ* (q.v.) and closely allied to the white-fishes (q.v.), with which they are sometimes placed in the genus *Coregonus,* or separated under the name *Argyrosomus.* They are distinguished from the true white-fishes by having the lower margin of the premaxillary bone horizontal instead of vertical, and by the larger mouth. Nine or ten species have been described from North America, most of them belonging to the waters of particular lakes or lake systems. The most important is *A. artedi,* which is found in the Great Lakes and adjoining regions, being represented in the small lakes of Indiana and Wisconsin by a slightly modified race. Under the name of lake herring it is the object of an extensive fishery on the lakes, second in value only to that of the true white-fish. It is a voracious fish, swimming in large schools, frequenting deep waters during most of the year, but spawning in the shallows during the winter. The other species inhabit various lakes and the river systems of Alaska, etc. Similar species also occur in Europe and Asia.

Cisleithan (sĭs-lī'thān) **Provinces,** Austria proper or Austria west of the river Leitha, which partly forms the boundary between it and Hungary. This portion of the Austro-Hungarian monarchy contains about 115,850 square miles. Pop. (1900) 26,107,304.

Cisleithania, a river on the boundary line between Austria and Hungary.

Cisneros-Betancourt, thēs-nā'rōs bĕ-tŏn-koor', **Salvador,** Cuban patriot: b. Puerto Principe 1832. He was a descendant of one of the best families of Spanish nobility, and possessed the hereditary title of Marquis of Santa Lucia. During the revolution of 1868–78, he was president of the Cuban House of Representatives, and during a part of the time president of the Cuban republic. In 1895 he was re-elected president of the new Cuban republic. His niece, Evangelina Cosio Cisneros, was imprisoned by the Spaniards for aiding the insurgents during the insurrection in 1896–7, and made a sensational escape, coming to the United States, where she became a protegé of Mrs. Gen. John A. Logan. His daughter tendered her services to the United States as an army nurse during the war with Spain in 1898.

Cispadane (sĭs-pā'dān) **Republic,** Italy, a republican state established by Napoleon in 1796, after the battle of Lodi. It comprised Bologna, Modena, Ferrara, and Reggio. In 1797 it was united with the Cisalpine Republic (q.v.).

Cisplatine (sĭs plā'tīn) **Republic** (Lat. *cis,* on this side, and Sp. *Plata,* name of the river on the boundary between Uruguay and Argentina). The Republic of Uruguay was called by this name from 1828 to 1831. Previous to becoming an independent state it had belonged to Brazil, and was called Cisplatine Province.

Cisrhenish Republic, or **Cisrhenam Republic,** several towns on the Rhine, particularly Cologne, Aix-la-Chapelle, and Bonn, at the time when so many republics were created, declared themselves independent, under French protection, and took the title of *Cisrhenish Republic* in September 1797. But at the Peace of Campo-Formio (17 Oct. 1797), the left bank of the Rhine, including the Cisrhenish Republic, was ceded to France by a secret article, and the confederation bearing this name is in consequence hardly known.

Cissampelos, a tropical genus of climbing shrubs of the natural order *Menispermaceæ,*

whose growth is similar to that of an ivy vine. The plant is of great commercial value because of its medicinal qualities, especially the velvet-leaf of Brazil, (*Cissampelos pareira*), the root of which supplies the spurious pariera brava, abuta root, used in medicine as a tonic. Other species growing in nearly all tropical countries are used for emetics and cathartics, and an East Indian species (*C. obtecta*) yields an intoxicating spirit.

Cissey, sē'sā, **Ernest Louis Octave Courtet,** French general: b. Paris 1811; d. there 1882. He was educated at the military school of St. Cyr and having served with distinction in Algeria and the Crimea, he was promoted in 1863 to be general of a division. He fought in the Franco-Prussian war, and in the contest against the Commune of 1871. He was elected to the National Assembly in February 1871, and was minister of war from 1871 to 1873, and in 1874–6. He was elected life senator in 1875.

Cis'soid, a curve in geometry, the locus of the vortex of a parabola rolling upon equal parabola. If pairs of equal ordinates be drawn to the diameter of a circle, and through one extremity of this diameter and the point in the circumference through which one of the ordinates is let fall, a line be drawn, the locus of the intersection of this line and the equal ordinate is known as the cissoid. This curve was discovered by Diocles while he was seeking the solution of the celebrated problem of the duplication of the cube.

Cist, Henry Martyn, American soldier: b. Cincinnati, Ohio, 20 Feb. 1839; d. Rome, Italy, 17 Dec. 1902. He graduated at Belmont College 1858, and began the study of law, but enlisted as a private in the Sixth Ohio Regiment 21 April 1861, attaining, before his resignation 4 Jan. 1864, the brevet rank of brigadier-general. He was post-adjutant of Camp Chase during the imprisonment of the Confederates captured at Fort Donelson, assistant adjutant-general of the Army of the Cumberland, and later, on the staff of Gens. Rosecrans and Thomas. After the war he practised law in Cincinnati, was twice mayor of College Hill, originated the project that resulted in the conversion of the Chickamauga battlefield into a national park, and was a contributor of military articles to the magazines. He wrote 'The Army of the Cumberland' (1882); and collaborated with Donn Piatt in a 'Life of General George H. Thomas.'

Cist, a place of interment of an early or prehistoric period, consisting of a rectangular stone chest or inclosure formed of rows of stones set upright, and covered by similar flat stones. Such cists are found in barrows or mounds, enclosing bones. In rocky districts cists were sometimes hewn in the rock itself. See Burial; Burying Places.

Cistaceæ, sĭs-tā'sẹ-ē. See Cistus.

Cistercians, sĭs-tẽr'shē-ăns, a monastic order in the Roman Catholic Church founded in 1098 by St. Robert of Molesme, a Benedictine monk of Cluny (q.v.) at Cistercium, near Dijon in France. After a year Robert of Molesme was succeeded as abbot by the monk Alberic and he in turn by St. Stephen Harding, an Englishman, who ruled the order during 25 years with great wisdom and who is regarded as its second founder and lawgiver: his day in the Church calendar is 17 April. The Cistercian order in his time grew to be the most considerable monastic order in the Church, and to him in great part is due the founding of the four greatest Cistercian monasteries of France, next after Citeaux, namely, La Ferté, Pontigny, Clairvaux, and Morimond. By the middle of the 12th century Citeaux had affiliated to it 500 abbeys and priories, and early in the 13th their number was 1,500, of which very many were convents or priories of Cistercian nuns. For 200 years the austere rule of St. Benedict as reinforced by St. Stephen Harding was maintained throughout the order: there was the chanting of matins and lauds at midnight throughout the year in the abbey or priory church; there was a strict fast on one slender meal from 14 September to Easter; there was abstinence at all times (cases of sickness excepted) from all animal food, save that very rarely milk was allowed. The austerity of the Cistercian rule extended even to the churches of the order: simplicity was sought in everything; there was no fatuous display of ornamentation, either of the edifice or of the vestments, or of the sacred vessels; the copes and chasubles employed in the church services were of white linen instead of silk or cloth of gold; the chalices and the pyxes, instead of being of gold incrusted with precious stones, were of plain silver. But the church schisms and the wars and civil commotions of the 14th century led to the plundering of the abbeys and priories, and the monastic discipline was greatly relaxed, so that on the one hand it became necessary for the see of Rome to sanction in some respects this relaxation, while on the other hand there arose zealous upholders of the ancient rules who brought back the primitive observance in all its rigor. Among the most notable of these revivers of the ancient rule was the abbot De Rancé of the monastery of La Trappe (q.v.) in the 17th century. At the dissolution of the English monasteries by Henry VIII. there were in England and Wales 115 Cistercian houses, of which 25 were for nuns. In the period of the French Revolution most of the Cistercian Cenobia, not only in France, but throughout the continent of Europe, were suppressed. In the United States there are two Cistercian abbeys, namely, that of La Trappe at Gethsemane in Kentucky, and that of New Melleray, near Dubuque, in Iowa. The most noted English Cistercian's houses were the abbeys of Furness, Fountains Rievaulx, Tintern, Kirkstall, and Woburn. A modern English Cistercian abbey is situated at Mount Saint Bernard, not far from Leicester. See Janauschek, 'Origines Cistercienses' (1877); Guignard, 'Monuments primitifs de la règle Cistercienne' (1877); Sharpe, 'Architecture of the Cistercians' (1874); Lefroy, 'Ruined Abbeys of Yorkshire' (1889); Eulart, 'Origines de l'architecture Gothique en Italie' (1893).

Cistern, a tank for holding water. Cisterns differ from wells in that they do not get their water from natural sources, such as springs, but through channels made by the hand of man. In hot countries, where the supply of water is not regular, or where rain water is used, cisterns are necessary for storing up water for future use. They are also largely used for the

supply of locomotive boilers at railroad stations. Cistern water used for drinking is usually filtered.

Cistus, the typical genus of the rock rose family (*Cistaceæ*), a family having four genera, and about 160 species, of which two at most are found outside the northern hemisphere. The American representatives of the family belong to the genera *Helianthemum, Hudsonia,* and *Lechea,* most of the species being pestiferous plants, such as the frost-weed or Canadian rock rose (*H. canadense*), poverty-grass (*Hudsonia ericoides*), and the pin-weeds (*Lechea*). Cistus does not grow wild in America, but some species are cultivated in greenhouses and the warmer regions for the beauty of their large wild roselike flowers, which are often of two colors. This genus, which is a native of the countries of Europe, is generally a beautiful evergreen flowering shrub, ornamental in gardens or shrubberies. Gum ladanum is obtained from *C. creticus,* and *C. ladaniferus.* This gum was formerly used as an external stimulant in plasters, but is now almost obsolete in medical practice.

Cit'adel (from the Italian *cittadella,* a diminutive of *città,* city; signifying little city), in fortification, a kind of fort, consisting of four, five, or six sides, with bastions, commonly joined to towns, and sometimes erected on commanding eminences within them. It is distinguished from a castle by having bastions.

Citation, a summons or official notice given to a person to appear in a court as a party to a cause. A writ issued out of a court of competent jurisdiction, commanding a person therein named to appear on a day named and do something therein mentioned, or show cause why he should not. Proctor, Prac.

In cases in which a citation issues it is generally the writ commencing the action, the same as a summons in trespass or a bill in equity. The citation is used by courts having control over the estates of the dead.

Cithæron, sĭ-thē'rŏn, or **Elatea,** a mountain, Greece, which stretches northwest, separating Bœotia from Megaris and Attica. Its loftiest summit rises 4,620 feet above the sea, and is the subject of numerous fables and classical allusions. On its northern slope stood the ancient city of Platæa, the circuit of whose walls may still be traced. Its modern name Elatea, from *elatē,* a fir, is derived from the pine forests which are abundant on its sides and summit.

Cithara, sĭth'ạ-rạ, a guitar-like musical instrument, said to have been invented by Apollo. The strings, usually five or six in number, were struck with a plectrum, or picked with the fingers, sometimes both methods being used at the same time. It was the forerunner of the banjo, guitar, zither, and all similar instruments. See LYRE.

Cities of the Plain, Sodom and Gomorrah, chief of the five cities which, according to the commonly received account, were destroyed by fire from heaven, and their sites overwhelmed by the waters of the Dead Sea.

Cities of Refuge, according to the law of Moses six out of the 48 cities which the Israelites were directed to give to the tribe of Levi, in the division of the land of Canaan among their tribes, were to be set apart as cities of refuge for the manslayer or accidental homicide. The right of avenging murder belonged to the next-of-kin of the murdered man; but the slayer fleeing to one of these cities, three of which were to be on either side of Jordan, the avenger of blood was forbidden to touch him till he stood before the congregation in judgment, when, if he were found to have acted without premeditation or malice, he had a residence appointed him in the city of refuge until the death of the high priest, and was then permitted to return to his inheritance. If the slayer violated this regulation by leaving the city of refuge before the death of the high priest, the avenger of blood might kill him with impunity. The six cities of refuge appointed in accordance with this law were Kedesh, Shechem, and Hebron on the west side of Jordan; and Bezer, Ramoth-Gilead, and Golan on the east. This law of refuge seems to have been favored by the Levites, to whom it gave a measure of political influence, much in the same way as the privilege of sanctuary did to the monks, abbots, and other dignitaries of the Roman Catholic Church; it was consequently interpreted by them in the most liberal way. Maimonides says that all the 48 cities of the Levites had the right of refuge, although only the six were obliged to receive and lodge the slayer gratuitously.

Citizen, originally, a member of the body of freemen entitled to share in the government of a *civitas,* or city-state of the ancient type; as the Roman state gradually broadened into the entire ancient world, the citizenship was extended piecemeal for political reasons, till Justinian made it coextensive with personal freedom, and the attribute of all residents of the empire except slaves. With the rise of the miscellaneous modern community, where flux of population permanent and temporary is going on, and the mass of people share in the government to a varying extent, the question of its limitations and the privileges it confers have become acute, and that of its legal definition has furnished one of the grounds of a civil war. The definition varies in different countries. In monarchies it is commonly used only of a resident's relation to his municipality, the term "subject" expressing the relation to the state; in republics generally it means a regular member of the community, subject to its ordinances, obligated to its support and defense, and entitled to its protection. In the United States, a complication is introduced by the federal structure of the government, there being a citizenship of each distinguished from that of the other. The questions arising in this country are therefore: (1) What constitutes citizenship; (2) What rights it confers; (3) How it is acquired; (4) How it can be lost; (5) What are the respective obligations to State and nation.

1. A citizen has been legally defined as "one who owes to the government allegiance, service, and money by way of taxation, to whom the government in turn grants and guarantees liberty of person and of conscience, right of acquiring and possessing property, . . . suit and defense, security in person, estate, and reputation." In a word, the citizen is one whose lot is cast in with his society, for all social purposes according to his status and means, to fight or pay unless he is a dependent member of a group which fights, pays, etc. This includes

women, children, defectives, and criminals; and excludes alien residents (see, however, section 3), and Indians living in tribal relations, who are «dependent subjects.» It should be added, however, that for jurisdictional purposes resident aliens are regarded as citizens, and in commercial and business legislation «citizen» is equivalent to «resident.»

2. Citizenship implies civil but not necessarily political rights. The former are one for all, and are the primary obligation of a government to secure to its members; political rights are endlessly varied and within the discretion of the government. The right of direct share in government is everywhere withheld from minors, convicts, and the insane or idiotic, nearly always from paupers, and most generally from women; but these do not cease to be citizens. On the other hand, voting has occasionally been permitted in this as in foreign countries to persons not citizens of a State or municipality, for holdings of property, and could be so again. It was on this distinction that the minority in the Dred Scott case based their dissenting opinion that a slave's lack of political rights did not prevent his being a citizen with a right to sue in the courts; and the government by the Fourteenth Amendment ratified this view, and definitely dissociated civil from political rights.

3. Citizenship may be acquired by birth, every child born on the soil or within the jurisdiction of the United States,— even of resident aliens, except of foreign official representatives, whose residences are assumed to be part of their country's territory,— or of citizen parents traveling abroad, or of its officials resident abroad, being a citizen; or by naturalization; or by succession to a parent's or husband's rights,— the wife of an alien becomes a citizen by his naturalization, or after his death before naturalization if he had previously declared his intention of becoming so; and the children inherit similar rights.

4. It may be lost by formal renunciation, but the abandonment will not be presumed without it, even from a lifetime of residence abroad; but the government, with most civilized governments at present, recognizes full right to change allegiance at will. This was one of the issues in the War of 1812, Great Britain firmly refusing to recognize it; and it was not till 1870 that that country formally admitted that right.

5. Dual allegiance. The nature of the obligations is different: any one may be a citizen of the United States, yet not of any particular State, but not *vice versa;* and as the citizenship of the nation is the more universal, so it is of the higher sanction. The two could not in fact come into conflict except through an act of secession, which must be fought out, so that the question is academic, as short of that the whole matter would involve a case in the supreme court, pending which the question would be in abeyance; but in case of forcible resistance of a State to a decree of the nation, the citizen's first allegiance is to the latter. Further than this, however, the national government cannot go beyond the scope of its reserved powers; and a State can go very far in the direction of abolishing even the civil rights of its citizens under the shelter of this flexible permission. It should be noted that the right of citizenship is totally unconnected in essence with the right of suffrage or the elective franchise. The former is an elemental right of all born among, or who have cast in their lot with, a civil society; the right to the protection of its laws and its strength, to a share in its benefits and its charities. The latter, a right to share in the governmental management of a society, is a mere question of the best machinery of management, and dependent on the fitness or power of individuals or classes to help guide that machinery. The unfit or weak are just as much citizens as the fit or the strong, by natural right; women and minors, defectives and criminals, have the fullest right to claim the protection of the laws, by themselves or their natural or appointed guardians. The suffrage is only a substitute for a battle, assuming that the larger body could outfight the smaller; and admission to it lies in the discretion of the fighting body.

Citizen King, The, a title applied to Louis Philippe, king of the French, 1830–48.

Citizen of the World, the signature of Oliver Goldsmith's 'Letters from a Chinese Philosopher residing in London, to his friends in the East.' The work was published in 1762.

Citizens' Industrial Association of America, The, a national federation of local employers' associations, citizens' alliances, and State and national organizations representative of business interests, organized as the culminating step in the movement for the organization of employers in 1903. Nearly all the large cities, and scores of the smaller ones, during the months following the anthracite strike of 1902, became the centres of considerable agitation on the labor question, and from 400 to 500 local associations sprung into existence for the purpose of combating what was termed the lawless aggressions of organized labor. The membership of some of these associations was confined to employers, while others, which adopted the general name of alliances, admitted professional men, and even employees, into their ranks. In cities like Chicago, Saint Paul, Omaha, Kansas City, Saint Louis, Detroit, Cincinnati, Louisville, and New York employers' associations were formed, while in Denver and all over Colorado and many other parts of the West, as well, also, in the smaller towns of the Central States, the alliance was the most popular form of organization. In response to a call issued by a number of the prominent leaders in the employers' movement, a convention was held in Chicago, 29–30 Oct. 1903, which was attended by nearly 300 delegates, who came from all parts of the United States and Canada, cities as far apart as San Francisco, New Orleans, Montreal, and Minneapolis being represented. The name of the Citizens' Industrial Association was considered as being inclusive in meaning of both employers' associations and citizens' alliances, and was selected by the convention for the new organization. The purposes, as set forth in the constitution adopted, were those of law enforcement, the maintenance of individual liberty, the securing of industrial peace, and the perpetuation of free competitive conditions in industry. The organization stands for the open shop, and no restriction of output. Its work is largely confined to that of educational propaganda, and it maintains a publication bureau for this purpose,

It does not interfere in any respect with the internal government of its constituent associations, and the action of its convention or executive committee is advisory and not obligatory upon its members. The association forms a central source of information for its members and a directing agency in matters of national legislation in which the associations generally are interested. In the contest in the present Congress over the eight-hour and anti-injunction bills, which are fathered by organized labor, the Citizens' Industrial Association is taking an active part. The National Association of Manufacturers is a member and one of the principal elements of support in the new organization. Its president in 1904, David M. Parry, was chosen by the Chicago convention as the first president of the association. The secretary, chosen by the executive committee, was A. C. Marshall, of the Dayton Employers' Association, Dayton, Ohio. Vice-presidents were J. C. Craig, of the Denver Citizens' Alliance, and J. T. Hoile, of the New York Manufacturers' Association, with offices in Brooklyn. The treasurer in 1904 was Major A. C. Rosencranz, of the Evansville Alliance.

DAVID M. PARRY,
President Citizens' Industrial Association.

Citizen, The a comedy by Arthur Murphy, performed 2 July 1761, at the Drury Lane Theatre, and printed in 1763. It is founded in part on Destouche's 'Fausse Agnès.'

Cit'ric Acid ($C_6H_8O_7,H_2O$), a very widely distributed acid, present in most common fruits, such as gooseberries, currants, lemons, citrons, cherries, and many others. It was first separated and distinguished by Scheele in 1784. It is generally prepared from lemon juice, the dark treacle-like fluid imported from Sicily, by fermenting it, filtering, and neutralizing with chalk and quicklime, by which citrate of calcium is precipitated. This, by decomposition with sulphuric acid, gives the acid, which is then purified by repeated crystallization. Several improvements have of late been introduced, both in preparing the crude lemon juice for exportation and in the subsequent purification and crystallization of the acid. Citric acid is white when pure; it crystallizes in two forms, one belonging to the trimetric system is the common form, and in it the acid contains one molecule of water, as indicated in the formula given above. The other form contains half the quantity of water. The ordinary crystals effloresce in the air in a warm room. Citric acid has a pleasant sour taste. It dissolves very readily in water, and is soluble in alcohol, but insoluble in ether. When heated it undergoes decomposition, and yields aconite, itaconic, and citraconic acids, along with other products. It is acted on by nitric and sulphuric acids, and by other reagents, yielding a variety of decompositions and derivatives.

Citric acid combines with the metals, forming citrates. They are crystalline salts, and many of them are soluble in water. Crude citric acid is largely employed by the calico-printer as a resist and as a discharge.

Citric acid and the citrates are used in medicine as cooling drinks, as antidotes to alkalies, and for the purpose of rendering the urine alkaline, thus overcoming too great an acidity. Citrates of magnesium are used as laxatives and cathartics, and are among the most efficient and pleasant of this class, being particularly adapted to children.

Citron (*Citrus Medica*, var. *genuina*), a bush or small tree of the natural order *Rutaceæ*. It bears reddish or purplish slender branches; smooth, oblong leaves; externally reddish flowers; and large, warted or furrowed, oblong or ovate fruits with a very thick, tender, aromatic rind, which is candied or preserved and used in cakes or confectionery. The mildly acid juice of the pulp is used to some extent with sugar and water as a drink like lemonade, or for mixing with and flavoring various liquors. From India, where the tree is native, the citron has been introduced into many warm climates throughout the world. It is sparingly cultivated in California and southern Florida, but more generally in the West Indies more as a home than an orchard fruit. Most of the candied citron on the American market comes from the Mediterranean region of Europe, where the trees are extensively cultivated. All the varieties, which vary considerably, probably on account of hybridizing with other species, are very susceptible to injuries by frost. They may be propagated by layerage, graftage, or cuttage, the first producing trees inferior in form to those derived by the other two methods. The orchards should be located on well-drained land well exposed to sun and air, which aid in preventing the attacks of insects and fungi. Clean cultivation, liberal fertilization, and the use of cover crops during the hot months, are the three leading factors in the cultivation of this crop in Florida. In the United States, the name is also popularly applied to a variety of watermelon with an edible flesh and generally red seeds. This citron is frequently grown in northern private gardens and to a small extent commercially for its rind, which is used for preserving in various ways. See CITRUS; LEMON; LIME; WATERMELON.

Citron-melon. See WATERMELON.

Citronel'la Oil, an oil obtained from a kind of grass (*Andropogon nardus*), cultivated at Singapore and in Ceylon. It is used for scenting soaps. Other species of the same genus and some other allied genera also yield essential oils.

Citronelle, sĭt-rō-nĕl', Ala., a village in Mobile County, where on 4 May 1865 the last Confederate army east of the Mississippi surrendered to the Federal troops under Gen. Canby.

Citronwood, or **Citrus-wood,** the most costly furniture wood of Roman antiquity, usually regarded as derived from *Biota* (*Thuja*) *orientalis*, or possibly from *Callitris quadrivalvis*, allied coniferous trees, both popularly known as *Arbor vitæ* (Oriental and African). Cicero is said to have paid an enormous sum for a table of this wood.

Città Vecchia, vĕk'kē-ā, or **Civita Vecchia,** a fortified city of Malta, near the centre, and almost on the highest point of the island, seven miles southwest of Valetta. Pop. 7,000.

Cittadella, chēt-tā-dĕl'lā, Italy, city in province of Padua, compartimento of Venetia; 30 miles northwest of Venice. Portions of its ancient walls still remain. It contains beautiful churches and botanical gardens. Its mod-

ern industries are the manufacture of paper and linen. Pop. 9,850.

City (Latin *civitas*). The Greeks and Romans distinguished a city from a town, or mere assemblage of people living together under municipal laws, as an independent community or state possessing sovereign authority, and including any portion of the surrounding territory the inhabitants of which possessed the rights of citizenship, but excluding conquered or dependent territories. Thus, Athens, Rome, and Carthage were all both towns and cities in different senses. In Europe the word city came to have two meanings, the one civil, the other ecclesiastical. The civil meaning corresponded with the Roman sense, in which the great Italian republics and the German free cities during the period of their independence corresponded with it. The fluctuations in the fate of such cities must necessarily have caused the word to lose the sense of territorial independence, and this change would be promoted by the rise of rivals to them in other respects having no such claim, so that in modern times a city has come to signify merely a town holding from extent of population, favorable situation, or other causes, a leading place in the community in which it is situated. The ecclesiastical sense of the term city is a town which is the see of a bishop. This seems to be the historical use of the term in England, and still possesses some authority there, but in general use it has been superseded by the wider one. In our historical retrospect we take the term in its least restricted sense. The origin of cities belongs to the earliest period of history. According to Moses Cain was the first founder of a city, and Nimrod built three, among which Babylon was the most important. The Jews imagine that Shem erected the first city after the deluge. At the commencement of society the form of government was patriarchal. The ruler was the head of the family or clan. Relationship, the innate wish of men to live in society, and more, perhaps, than both these causes, the necessity of providing means of defense against more powerful clans, brought together separate families into one spot. The fertility of the East also afforded facilities for men to give up the rambling life of nomads and to form permanent settlements. These settlers began to barter with those tribes who continued to wander with their herds from place to place. Thus cities sprung up. These were soon surrounded with walls to prevent the inroads of the wandering tribes. The bond of connection between their inhabitants thus became closer, and their organization more complete. As by degrees the chiefs of these family-states died away, the citizens began to elect the most able or most popular men for magistrates, without respect to birth or descent. Thus political institutions began to assume a systematic character. The earliest forms of government succeeding the patriarchal state was probably monarchical. In this the religious, paternal, and political authority remained rudely mingled. When conquest extended the limits of these early kingdoms the authority of the king was weakened, his connection with the different parts of his dominions became imperfect, and the progress of civilization was promoted almost solely by the growth of the cities. These gave rise to the division of labor, the refinements of social intercourse, the development of laws caused by the conflicting interests of many people living close together, the idea of equality of rights, the diminution of awe for a distant monarch, the growth of patriotism, springing from the sense of advantages enjoyed and the exertions necessary to maintain them. These were the salutary consequences of the establishment of cities. Under the mild sky of Asia, Africa, Greece, and Italy cities were built first, and in the greatest number. The Phœnicians and Egyptians particularly distinguished themselves by the erection of cities, which soon attained a high degree of wealth, and consequently of civilization. The Egyptians considered their city of Thebes older than any of the Greek cities; and Pliny says that Cecropia, said to have been erected in Attica by Cecrops, 1582 B.C., and afterward called "Athens," was the oldest city of Greece. Heeren justly remarks that the rise of cities was the most important source of the republicanism of antiquity. This is particularly true of Greece. In fact cities are, by their very nature, of a democratic tendency. Several confederations of cities existed in the ancient world; for instance, the Phœnician, consisting of the cities of Tyre, Sidon, etc., and the Achæan league, formed by the most important cities of Greece, in order to strengthen themselves against the power of Macedon. Under Augustus and his successors the Romans began to establish colonial cities in Germany, having done the same long before in Gaul, Spain, Africa, etc. In Switzerland they first erected cities about 70 A.D., which, however, were mostly laid waste by the Alemanni, and subsequently rebuilt under the government of the Franks (496 A.D.). The Germans, accustomed to a wild, rambling life, did not show any disposition to live in cities until Charlemagne labored to collect them together in settled abodes from his desire to civilize them. Henry I. distinguished himself particularly in this way, and on this account has been called by some "Henry the City-builder" (*der Stadterbauer*). He gave the cities great privileges, in order to induce his subjects to live in them, and thus laid the foundation of that power which at a future period contributed most to break down the feudal system. In many cities imperial castles were erected to protect the inhabitants, and the insupportable oppressions and even cruelties exercised by the feudal lords upon their peasants, or by the wandering knights and robbers, drove many people into the cities. The attacks of the neighboring lords gave firmness to their union, and compelled them to cultivate their resources. Commerce and the various arts and trades were soon cultivated within their walls, and their wealth and respectability increased. They soon became sensible of the want of a better system of laws and political administration than prevailed around them, and the principle of equal rights and laws was quickly developed.

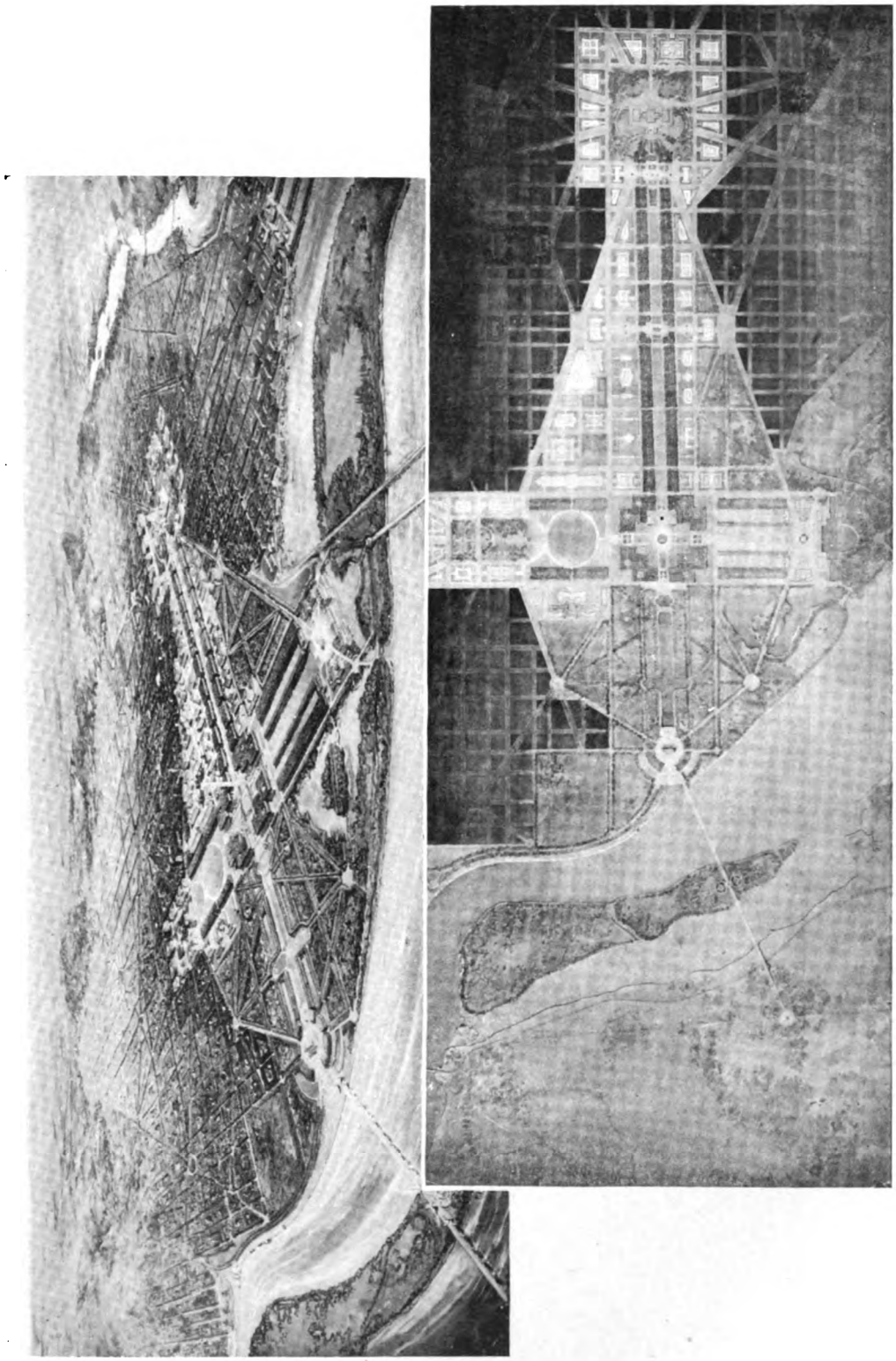
One of the most important remnants, if not the most important, of the great fabric of ancient civilization, was the cities of Italy. In spite of their bloody contests with each other, and the vices of an oligarchical government, Europe is mainly indebted to them for the cultivation of the commercial spirit, together with the toleration and love of liberty, which, under

the most unfavorable circumstances, it tends to foster, and for that ardor in the cultivation of arts, science, and literature, which has always distinguished the best periods of Italian history, and from which the general revival of learning in Europe, called the Renaissance, took its rise. Under the reign of Conrad III. (1138–52) the cities of Lombardy, and particularly Milan, which stood at their head, had acquired a high degree of wealth and power, and had formed themselves into a confederation. The struggles between the emperors and these cities form one of the most important portions of the history of the German empire and of Italy. Frederick I. in vain demolished the powerful city of Milan. It was soon rebuilt, and the cities of Lombardy, in alliance with the Pope, obliged the emperor to conclude with them a very disadvantageous peace at Constance. Two other confederations of cities, highly important, were formed during the interregnum of the German empire, between 1256 and 1272. One of them was the powerful Hansa, or Hanseatic League (q.v.), the other the confederacy of the High German and Rhenish cities, from the foot of the Alps to the mouth of the Main, established by Walpode of Mentz in 1255. A similar confederacy, and a very important one, was that of the Suabian cities, instituted in 1488 to repel the outrages of the feudal lords and knights. The cities of the Netherlands, from their central position between France and Germany, exercised a powerful influence on the growth of civilization and political liberty in Europe. Their favorable situation and the enterprise of their inhabitants early gave them great wealth and power. The democratic spirit, ultimately carried to the greatest height in Holland, was earliest manifested in the towns of Belgium, which began in the 12th century to manifest a turbulent disposition, and by frequently leaguing themselves with the enemies of their feudal superiors extended their political privileges, and acquired at times a premature independence, which, though ultimately extinguished in the spirit of nationality, contributed not a little to the breaking up of the feudal system (q.v.). In Spain municipalities were established at an early date. Leon received a charter in 1020, Sepulveda, Lograno, Sahagun, and Salamanca followed soon after. The constitution of the Spanish towns approached more nearly to the ancient idea of a city than was common in other large states of Europe, in this resembling the Italian cities. Their constitution was extremely democratic, and they ruled over a large extent of surrounding territory, which they were bound to defend. Deputies from the towns were admitted to the cortes in the 12th century (1167 and 1188). The love of liberty rose high in these ancient Spanish cities, but from the isolation of the Iberian Peninsula they exercised little influence in Europe, and they soon lost their power and importance, most of them by the end of the 15th century having ceased to send their representatives to the cortes. By degrees the cities acquired in the different countries of Europe the right of representation in the legislative bodies; and wealth, industry, knowledge, and equal laws spread from them through Europe. But the cities of Lombardy, though still flourishing and wealthy, had fallen, for the most part, under the rule of single families; their republican governments vanished, and their confederation was dissolved. The associations of German cities experienced a similar fate. By the Peace of Westphalia the princes of the German empire were declared sovereign powers, and the more their authority increased the more did the relative weight of the cities diminish. These had formerly suffered from the oppressions of the feudal lords. They were now the victims of the policy of the neighboring princes, whom envy often led to adopt the most unwarrantable measures against the cities, many of which had lost their independence before Napoleon dissolved the German empire. He took away the privileges of those which remained free; and the Congress of Vienna restored freedom to Lübeck, Hamburg, Bremen, and Frankfort, only because the different powers could not agree to whom they should be assigned. At the same time Cracow was declared an independent city, with a republican form of government.

Cities, as we have seen, naturally develop the democratic principle, and on this and several other accounts are to be considered among the firmest supports of liberty. Well-organized municipal institutions, in which the government is in the hands of the citizens, afford continual nourishment to the spirit of freedom throughout a country.

In the United States a city is an incorporated municipality, usually governed by a mayor, alderman, and common council. In many of the States, especially the eastern, the number of inhabitants required for legal municipal incorporation is 10,000. In several of the western States a much fewer number is required. A village or town of 10,000 or more inhabitants is not obliged to become a city, and in several cases places of 20,000 and 30,000 have preferred, for local reasons, to remain under village government. In the United States cities are generally the outgrowth of villages, one village expands into a town with population sufficient to assume the duties of a city; but in several instances, villages near each other have united to form a city, and sometimes cities nearby have united in one municipality.

Much has been said and written upon the immorality of large cities, and it cannot be denied that they have vices peculiar to themselves; but it must be considered, on the other hand, that they are free from many of those of petty towns, and even of rural districts. The association of men in masses, when due surveillance is exercised, has an influence distinctly favorable to the maintenance of social order, the impartial administration of justice, and, above all, the suppression of all petty and local tyrannies, and the maintenance of individual liberties. It is by the influence of cities alone that a sufficient organization for the support of education and the means of enlightenment is obtained, even though that organization often fails to penetrate the entire mass of the cities themselves. It is to them that many of the facilities for progress in art and science are due. It is in them that public opinion is formed, and so organized as to act upon the administration, and, even independently of direct representation, upon the legislation of a country; and although the individual freedom enjoyed in great cities may often tend to license, its general influence in an otherwise healthy community is highly beneficial to the moral tone of the whole. It must, however, be



PLAN AND BIRDSEYE VIEW OF A PROPOSED ARRANGEMENT FOR WASHINGTON, D. C.

admitted that the democratic spirit in cities is liable to be carried too far, and that an excessive growth of large towns might thus prove dangerous to the State.

As regards mortality, New York compares favorably with most of the larger European cities, of which St. Petersburg and Moscow have the highest death-rate (29 or 30). Cities in Great Britain and Canada seem to be much on a par with those of the United States. Asiatic cities stand much higher. See MORTALITY.

City-making.—Although in the history of the world, cities have occasionally sprung up by fiat and have thus been deliberately planned, giving scattered examples of practical city-making on a large scale and more or less satisfactory in character, the rule remains that most have usually grown by extension and accretion from smaller communities, and their growth has had no other law than the requirements of the moment and the unorganized practical and æsthetic impulses of individuals and corporations. The units of a community have always, indeed, united for common ends, but rarely with a conscious regard for a civic ensemble, and still more rarely with regard to the necessity of preserving to the community the means of further extension on lines foreseen toward a larger whole, of which the existing city should be a concrete and vitally related part. The surge of the population toward the great centres which has marked the rise of the industrial spirit and the enormous growth of the cities in the United States and Germany has brought the subject into clear prominence, and for the first time in history science has seized on this field and endeavored to trace the natural laws and phenomena of civic life and civic growth, and to point out to the practical worker the condition of his problem.

The modern science of city-making, then, has sprung up in answer to a manifold need in the cities of to-day. From the reorganization of the entire plan of a city like that being undertaken by the city of Washington, D. C., to matters of the discipline of the street in one form or another, its principles are becoming more and more clearly recognized in the minds of the people, and in the laws and regulations that are its outcome.

In the extension and widening of streets which, as originally planned, were too narrow for the traffic that has surpassed the hopes of the early founders, and in the parking treatments by which we try to counterbalance the aridity of the unbroken stone and brick, we have one of its fields which is most obvious. Another is seen in the growing sentiment that the fixtures on our streets must not be merely functionally suitable, but should also be at least neat in design and quiet in color, if they cannot have positive ornamental value. Along this line may also be mentioned the desire, on æsthetic, as well as practical grounds, for the burying of wires and the clearing of our streets of the forest of poles so destructive to the architectural beauty of a city. In the improved disposal of garbage and in street cleaning, a somewhat stronger position has been early assumed from the direct practical necessities of the case. It is in spacing and the insuring of breathing spots in our cities that a haphazard and unscientific method, one, indeed, almost of accident, is to be clearly observed. No city of any importance is without its parks, but few have a park system, and in few cases is there evidence of anything but chance in their location. The science of city-making touches on questions of the control of private action at a number of important points. For instance, in Massachusetts, the trees along the sidewalk are considered so far a public benefit that the public interest in them is held to exceed that of the owner, and he may not remove or injure them except by official permission. In the attempt to restrain the voiding of immense clouds of bituminous smoke into the atmosphere, we have another example in point. The municipal oversight of architectural designs in this country, chiefly restricted to constructional features, is in foreign countries extended to a municipal oversight of designs from the architectural standpoint, and this which might, in certain cases, prove a source of tyranny, has, like all similar regulations, a counterbalancing advantage to the community. In the municipal control of posters and signs we again see the same readiness to defend the citizen on grounds of morality or from the danger of falling signs, but we must still look abroad, except in a few isolated cases, for an official expression of the growing conviction that on artistic grounds, as well as for the good of the general neatness and dignity of the city, there should be restraint on artistic grounds also. In functional matters, in the disposal of sewage, in all matters of construction, there is little need for other than a more exact and logical application of principles already well thought out, but in the employment to advantage of the city's physical opportunities, and in the expression of a municipal pride at all commensurate with the pride which every citizen feels in his own personal domain, we are yet in the early stages of development. How far we have still to go can best be judged by the advance that has already been made at isolated points. Governmental and municipal buildings are being more monumentally handled. They are being protected in some measure from private encroachment. Water supply systems have in more than one instance given handsome buildings, and in at least one case ornamental reservoir lakes.

In municipal pageantry our cities have taken a great step forward in the last 10 years. The various local celebrations that took place at the close of the Spanish war are an example in point, and while we have not yet the extensive paraphernalia such as belongs to almost every considerable city on the other side of the ocean, our cities at least own the nucleus of a collection of civic ornaments for use on occasions of public festivity. Hygiene, on the other hand, has been a powerful appeal. Our regard for it has opened up breathing spots like that at Mulberry Bend in New York, and it is natural that moral and ethical grounds should have taken precedence over the æsthetic.

The history of the modern movement as a conscious scientific effort begins with the work of Louis Napoleon and George Eugene Haussmann in Paris, who, a year after the proclamation of the second empire, decided on the first great and comprehensive scheme of modern city-making. In the following years a scheme of urban development was carried out in Paris which still remains an unsurpassed object les-

son. Under Haussmann's administration the movement achieved remarkable results, and being in a position to assume title to the improved areas, the increase in values was in large measure preserved to the community and a clear demonstration was made of the fact that such gigantic civic improvements, far from being costly luxuries, could be made paying investments. As prefect of the Seine he transformed a congested and unorganized centre into the most splendid capital of modern times and created a new profession in which his name yet remains the most eminently distinguished.

It was not until many years after that the Germans began to consider the symmetrical development of cities along equally broad lines, though once their attention was turned to the subject, with customary thoroughness they developed a system entirely their own, so that now nearly every German city of over 25,000 inhabitants has a department in its municipal government devoted to city expansion where all problems of extension and improvement are regulated.

George E. Hooker writes on this subject as follows: "Indeed, the great widening of municipal action in the cities of the fatherland respecting education, recreation, charity, hygiene, and 'municipal trading' is less significant than the attempt to give proper shape, both for economic and æsthetic ends, to the entire physical organization of those cities. The authorities have set up the ideal of a city which, in arrangement and structure, should be a rational unity; and while the results achieved have naturally been limited, they are in many respects surprising.

"Hamburg, for example, could displace 30,000 people in order to obtain a proper location for new docks. Nuremburg, while developing into a modern industrial town, has studiously perpetuated its delightful architectural spirit, and any German city which should to-day lay out or permit to be laid out, a new quarter on the easy and wearisome checkerboard plan would be laughed at. There have actually developed in Germany — and in Austria, too — especially during the last dozen years, the rudiments of a real science of city-building, with a limited but distinctive literature of its own."

The appearance of Dr. Albert Shaw's books on municipal government in 1895 gave a distinct impetus to the municipal improvement movement in this country. His painstaking accounts of organic development in many foreign cities and the methods by which they were brought about, created widespread interest, starting a wave of popular enthusiasm and activity, which is evinced by the numerous associations with large and influential membership to be found in almost all progressive centres in the United States.

Among the pioneers in the work was the elder Olmsted, who did much to reclaim numbers of bare spots in American cities and might be considered the father of American parks, although he never carried his work so far as did one of his disciples, the late Charles Eliot. It was Mr. Eliot who blazed the way toward metropolitan development by utilizing the barren and squalid outer zones about Boston for a regular chain of parks, and actually, before his untimely death, establishing in and about Boston the most comprehensive system of public reservations that any city can boast of, including the redeeming of nearly all water fronts both inland and along the sea. Indeed, the extent of the advantages of these reservations to future generations is not to be estimated, as they ensure a certain amount of openness and verdure for all time, notwithstanding the greatest possible increase in population. Boston, thanks to his foresight, is far ahead of any other municipality in the United States in matters of public recreation and health, and has that which no foreign city can rival. Her water supply, including that of over a score of contiguous communities, is protected from pollution by including the entire eastern watershed of Massachusetts, and for the first time reservoirs have been made to do double duty by becoming ornamental lakes, and as such, spots of much interest in the metropolitan system.

The Boston metropolitan park system was not brought about without much agitation, and to Mr. Sylvester Baxter must be attributed much of the success of the undertaking. His far-sighted articles appeared with great regularity and did much to mold public opinion in favor of the undertaking, and as secretary of the first metropolitan park board, he was able to still further assist in the work.

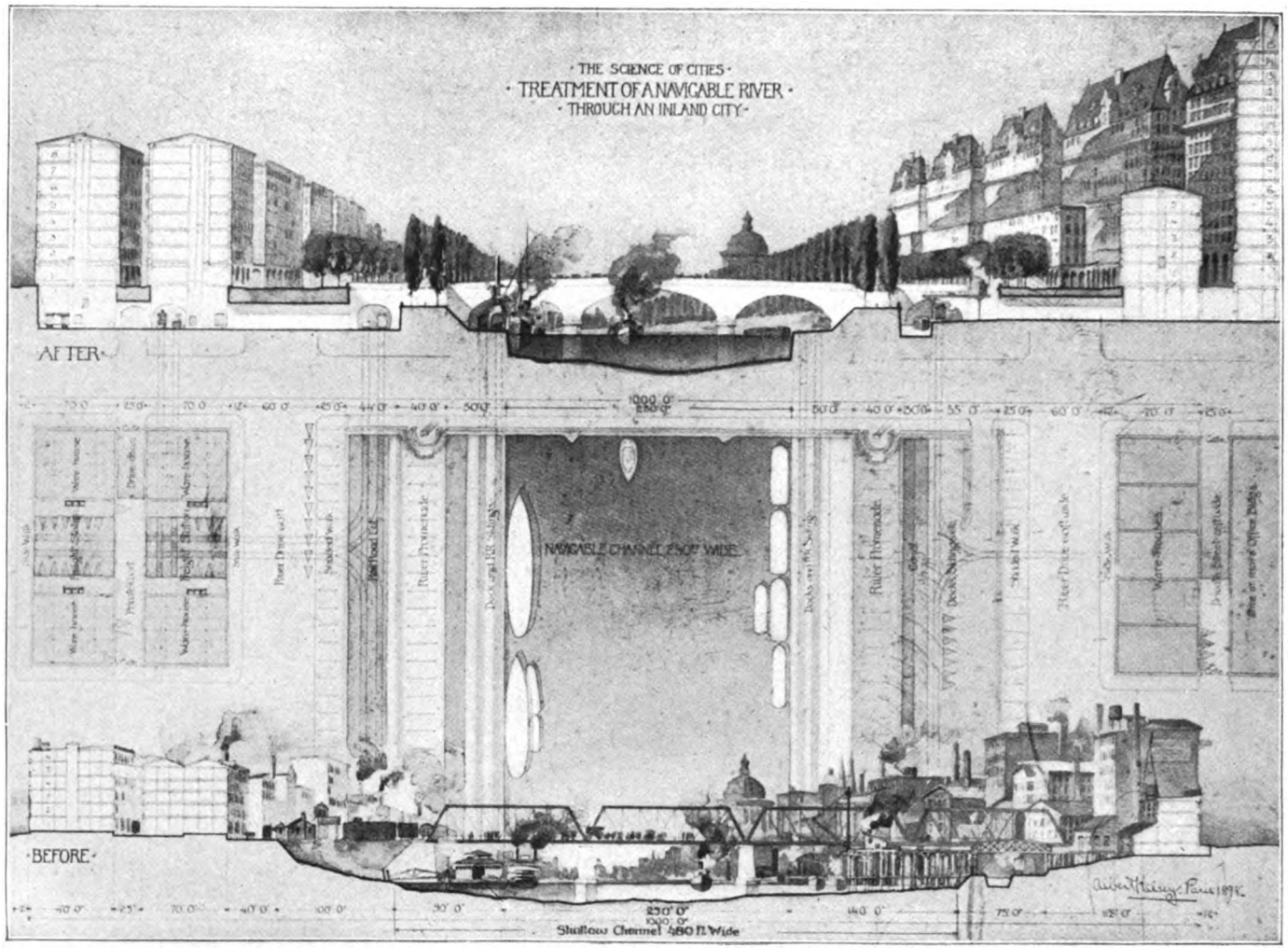
Since that awakening other writers have come to the front, and prominent among them are the names of Mr. Charles Mulford Robinson and Prof. Charles Zueblin. The former's book, 'The Improvement of Towns and Cities,' is a hand-book which has been endorsed by many improvement societies and which, owing to its concise and business-like presentation, is just what is needed by those interested in the development of backward communities. 'American Municipal Progress' by Prof. Zueblin, goes rather into the sociological side and outlines with surprising interest what an awakening has taken place in the United States during recent years, and what unexpected results this awakening has brought forth along lines of physical development.

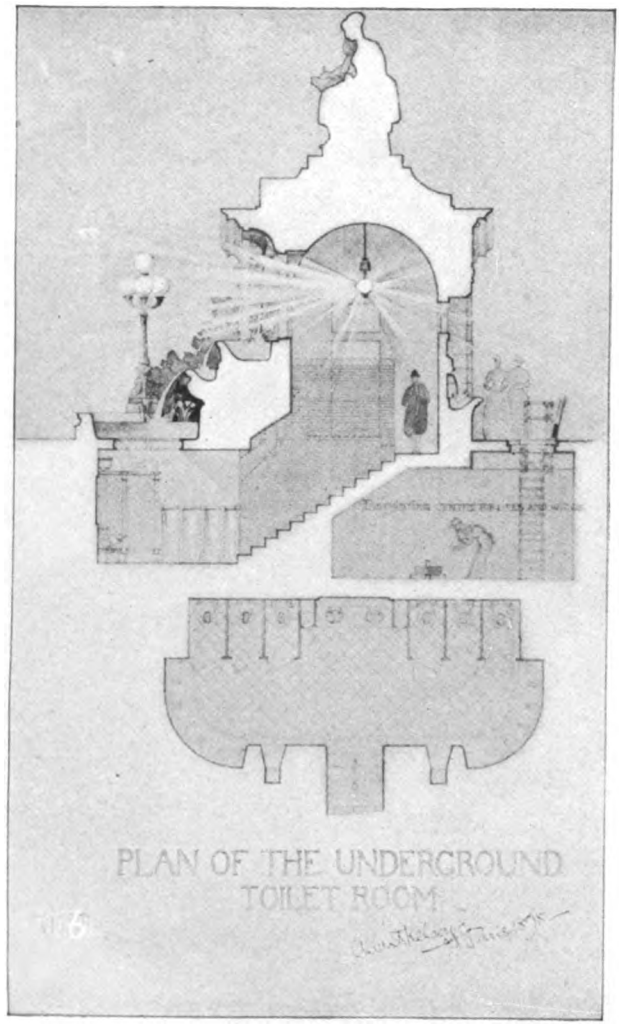
Among other of the forces that must be recognized as responsible for the force of the movement are the American League for Civic Improvement and the American Park and Out-Door Art Association. The latter is the older, and through the indefatigable efforts of Mr. Warren H. Manning, the landscape architect, it is well established, and by bringing park superintendents together from many cities it has become a real force and has extended its work beyond the province suggested by its title.

The American League for Civic Improvement, not being restricted either in name or endeavor to a group of professional workers, has carried on a broader campaign and through many local organizations all over the country is doing good work.

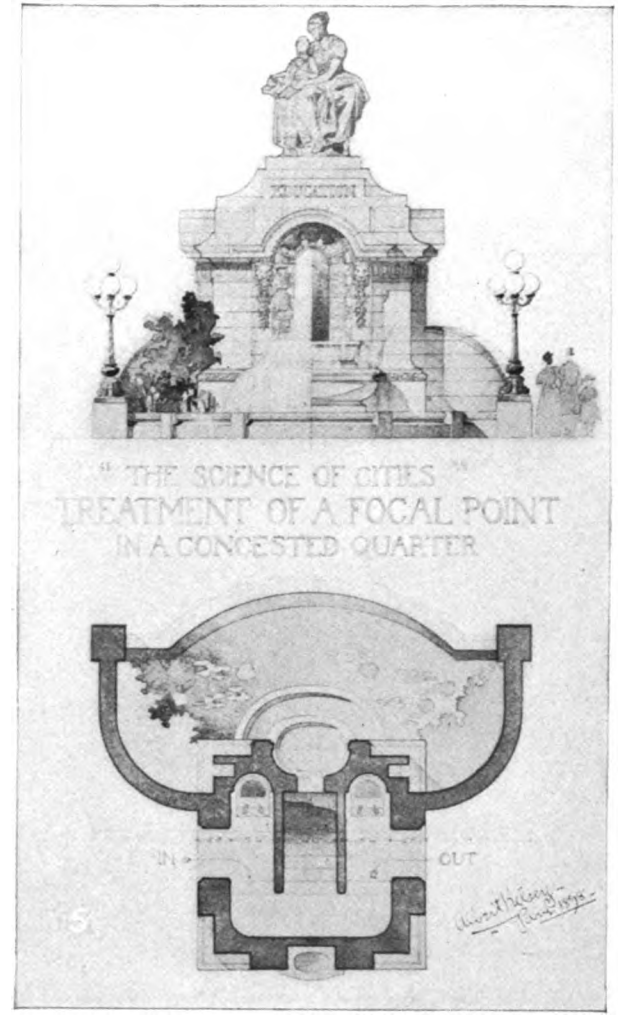
The first great object lesson of symmetrical development was exemplified by the Chicago Exhibition, where a comprehensive plan was prepared and adhered to. The height of all main cornices was established at an equal level and certain uniform rules applied to the development of the grounds, the buildings and all architectural accessories. Since then more or less successful efforts along similar lines have helped to educate the public at Omaha, Charlestown, Buffalo, and St. Louis.

The Omaha, Charlestown, and Buffalo exhi-


THE SCIENCE OF CITIES
TREATMENT OF A NAVIGABLE RIVER
THROUGH AN INLAND CITY
AFTER
BEFORE
NAVIGABLE CHANNEL 250' WIDE
Shallow Channel 480 ft Wide



PLAN OF THE UNDERGROUND
TOILET ROOM



"THE SCIENCE OF CITIES"
TREATMENT OF A FOCAL POINT
IN A CONGESTED QUARTER

IN

OUT

bitions, and particularly the Louisiana Purchase Exposition at St. Louis, with its Municipal Improvement Section, popularly known as the "Model City," the first of its sort to be held in America, have swelled the current. This latter exhibit, under the direction of the writer, brought together results that had proven the nucleus of interest in municipal subjects at the Paris Exposition of 1900 and the Exposition by Municipalities at Dresden in 1903, as well as the exhibits from the United States.

Nevertheless, the recognition of the need for immediate and radical work toward civic betterment finds the nation better provided with

true-hearted soldiers, anxious to work in the ranks, than with enough good leaders to point the way toward the much-coveted ideal, or even any steps toward it. In a recent article in one of the leading magazines, Mr. J. Horace McFarland gives extracts from letters all over the country, the tenor of which was,—"there is much to do and many who stand ready to do the work, but we need leaders."

The primitive character of some of the needs proclaimed by the organizers of societies for municipal reform would be amusing, if it did not mirror a state of affairs almost incredible. From several towns we learn that the hogs are permitted to run the streets at large, and this fact alone hints at others which are not creditable to the sense of civic pride in these communities. It is interesting to note, however, that almost every educational institution has recognized the importance of the movement, and that municipal governments have also been forced to take note of its growth by the extension of those bureaus of administration, the work of which relates to the care and development of the civic domain, and by the appointment of additional officers, such as city architects, foresters, etc., in addition to the engineering force. Moreover, Boston has added a municipal nursery to its civic departments, and thus its verdure has become a matter of as much public concern as the water supply. New York has an architect on bridges, and many park boards now properly insist on having all designs for contemplated improvements prepared by an expert commission, including a landscape architect, an architect, and an engineer.

The plan for the embellishment of the city of Washington, prepared by the Park Board Commission, of which Daniel H. Burnham was chairman and Charles F. McKim, Frederick Law Olmsted, Jr., and Augustus St. Gaudens the other members, is at the present writing the

best illustration of organic city-making actually under way in the country, though other cities, notably Cleveland with its group plan, are following suit.

Two of our illustrations show this plan for the regeneration of Washington, in which, by means of a number of monumental avenues, a series of vistas will be opened up, each with notable foci, such as large public buildings or monuments, by which the city will be given unity of plan and will outrank most cities in ease of access from part to part, and in the magnificence of its public ways. The chief of these avenues will be the new Mall, and it is only proper to add that this is a return to the ideal of the original designer of the city plan, developed on a more magnificent scale and glorified by memorials and architectural masterpieces that have come as the expression of national growth and history.

Another illustration, Figure 3, shows the work that has been done in the neighborhood of Boston, and may be taken as the type of the highest accomplished result in the development of an extended park system in and about a large municipality. The feature of this plan which distinguishes it from all others is the attention given to the future. By acquiring all water fronts, inland and seashore, Boston is gradually extending its park system and improving its waterways for all time. The city as a unit a hundred years hence is being arranged for. In the meantime a metropolitan system of scattered units is rapidly crystallizing.

Other illustrations exhibit in diagrammatic form the possibility which has at more than one point become an accomplished reality, of governing the character of the natural waterways. A river or any water front, whether now given up exclusively to commerce or whether it shows a broad, unhealthy mud-flat on either side, can be easily redeemed. According to the exigencies of the occasion the treatment must vary, but taking the most demanding conditions, it will be seen that the requirements of traffic by rail and water may be much better met if the problem is comprehensively studied, that the logical arrangement of the various structures is economical in every sense, and gives the opportunity to bring the beauty of shaded drives where formerly the conflict of the various enterprises made only confusion and barrenness. Moreover, the river being now confined within vertical banks, the current scours its own bed and the railway and canal are, moreover, protected from inundation. Thus, natural force and inventive planning combine to improve the salubrity, beauty, and revenue yielding power of an area in which private and public interests being at conflict have lost all trace of the beauty that once belonged to them, and which could again be theirs by conciliation of purposes and the expressed sense of interdependence between the various needs of society.

Figs. 5 and 6 are a project for the grouping together of public conveniences, a problem of the utmost importance in the congested portions of cities. In this drawing an attempt has been made to show how, instead of a number of scattered and unsightly units which have no excuse but their utility, the same ends may be efficiently served, while adding to the city a focal point of beauty.

Moreover, such centres, no matter what form their superstructure may take, should be points from which to thread pipes and wires radiating in all directions, and thus making unnecessary the greater part of the outrageous tearing up of streets, now of so frequent occurrence. Here again can be laid stress on the principal aim of municipal science, which is to replace the haphazard and accidental arrangement of cities with its incalculable waste of time, money, comfort, and beauty by a logical system and arrangement by which the needs can be at least as well met for a city as they now are for even the most complex of single buildings, and in which the various public and semi-public buildings can be so grouped with mutual economy. The transportation facilities of our cities are inadequate and yet wasteful of space, and without due regard to the convenience of the public; yet at no greater cost, by well considered arrangement at the outset, a system of stations and subways could lead to terminal facilities of sufficient capacity and in more direct relation to the requirements of business.

In this connection are to be mentioned the terminal warehouses in St. Louis, where a private company has united the depots of many independent railroads, thus forming a great freight centre, which has proven an isolated but striking lesson in economy. At Algiers, in North Africa, a similar combination exists between the steamship companies and the railroads. The dryness of the climate has here made it possible to use for this purpose huge vaults, above which passes the magnificent Boulevard de la Republic, a combination of utility, economy, and beauty, which should prove a spur to nations which pride themselves on their superiority in other matters.

Mankind has been so long accustomed to the economy gained by uniting for common ends that it seems more remarkable that the question of location, in its relation to the functions assumed by society, has not been more carefully studied. We have municipal hospitals, theatres, libraries, school houses, public baths, and gymnasia, and recreation grounds, from the sand-courts for the smallest children to the ball parks for men, but instead of being made centres of improvement which, as functional centres they should normally be, they are too often ill placed and inadequately arranged.

With regard to school houses this is especially true. There these buildings, so essential to our democratic system, have been erected with regard to an outward appearance befitting their functional character, and have been given that amount of yard space per child which should be made an invariable requirement, as it now is in some places; they have become the centres of local pride and local improvement, and have raised the value of neighboring properties and gone far to reduce local jealousies caused by the placing of those large public works which, unlike school houses, are not the necessity of every ward.

Resolved to its final analysis, the science of city-making appears under the heads of circulation, hygiene, and beauty, and concerns itself with the uniting of these three problems in a scheme of urban life and development in which they shall be fused in a perfection of interdependent and co-related response to the universal needs of man. The conditions of the age, the

climate and the location, if rightly interpreted, will give it the expression of a perfect and model city in the terms of the given land and people.

ALBERT KELSEY,
Civic Architect.

City Government. See MUNICIPAL GOVERNMENT.

City Point, a village in Prince George County, Va., 10 miles northeast of Petersburg; on the James River and on the Norfolk & W. R.R. It has a trade in brick, lumber, and phosphates, and is of considerable historical interest. Here, in 1864, Gen. Grant made his headquarters, and in his subsequent operations the city was used by the Federal army as its principal landing-place and depot for supplies. Pop. about 1,000.

City Politiques, pŏl'ĭ-tēks', a satirical comedy, probably printed for the first time in 1683, and produced at the King's Theatre, London, the same year. It was a sharp attack on the contemporary Whig faction, especially on Oates. Only the king's protection kept it from being suppressed by the victims of the satire.

City of Brotherly Love (Gr. *φίλαδλφίο, philadelphia, φίλος philos,* dear, and *ἀδελφός, adelphos,* brother). William Penn gave the English rendering of the two words as the name, Philadelphia, to the city in Pennsylvania. The common rendering into English of the name of the city is "City of Brotherly Love."

City of Churches, a name given to Brooklyn, N. Y., because of the large number of churches in proportion to the population.

City of David, Bethlehem (modern Beit-Lahm, house of bread), supposed to be the birthplace of David, the place where his descendants had to go for the enrollment, when the census was taken by order of the Roman emperor. Jerusalem is sometimes called the "City of David" because he captured it from the Jebusites and made it the capital of his kingdom.

City of Destruction, The. In Bunyan's 'Pilgrim's Progress' Christian begins his journey at this city and journeys to the Celestial City. The place of beginning represents the world with its temptations, and the place of ending, Heaven with its joys.

City of Dreadful Night, The, a poem by James Thompson. In this poem one is supposed to have gone to a city whose inhabitants are gloomy, hopeless, despairing. The hopeless darkness is as the night — oppressive and dreadful.

City of Elms. The large and ancient elm trees which adorn the Green and many of the older streets of New Haven, Conn., have caused this city to be called "City of the Elms."

City of God, The, a noted work by St. Augustine. This, the most important of all the saint's writings, was begun in 413, three years after the capture and pillage of Rome by the Visigoths under Alaric. The pagans had endeavored to show that this calamity was the natural consequence of the spread of the Christian religion, and the main purpose of Augustine is to refute them. The work was finished about 426.

City of Homes, a name bestowed on Philadelphia, from the large number of dwellings inhabited by the owners.

City of a Hundred Towers, a name given to Pavia, Italy, from the many towers and steeples which first greet the traveler.

City of Magnificent Distances, The, a name given to Washington, D. C. When the city was planned, the last of the 18th century, the long and broad streets, with here and there small parks, almost all of which was out long distances in broad fields, caused this name to be given to it in derision. Now its citizens are proud of the title.

City of Oaks, a name given to Raleigh, N. C., from the size and beauty of some of the oak trees which adorn its streets.

City of Palaces, a name applied to Calcutta, India, from the numerous palace-like edifices.

City of the Plague, The, the name of a poem written by John Wilson (Christopher North), published in 1816. It is said to have been founded on the 'Journal of the Plague in London,' by Defoe.

City of the Prophet, a name given to Medina, in Hedjaz, Arabia; the second holy city of the Mohammedans; the place where Mohammed took refuge, in 622, when he fled from Mecca, and the city where he died.

City of the Straits, often applied to Detroit, Mich., from its position. It is situated on that part of Detroit River between Lake St. Clair and Lake Erie.

City of the Sun, a name given to Baalbec, an ancient city of Syria, built on the ruins of the Greek city, Heliopolis, "The Sun City."

City of the Violet Crown, The, a name applied to Athens.

City of Victory, a translation of the Arabic name for Cairo, the capital of Egypt.

City Water Supply. See WATER SUPPLY OF CITIES.

Ciudad, thē-oo-dăd' or sē-oo-dăd', in geography, the Spanish word for city, from the Latin *civitas,* appears in many names of Spanish places, as Ciudad-Rodrigo, Ciudad-Real, etc.

Ciudad, thē-oo-dăd' or sē-oo-dăd', in Venezuela, capital of the state of Bolivar, on the Orinoco. Although about 245 miles from the mouth of the Orinoco, it is one of the chief ports of Venezuela. The handsome dwellings, beautiful cathedral, theatre, monuments, and plazas make it a pleasant city. Its chief exports are sugar, coffee, rubber, cattle, hides, asphalt, and cabinet woods. The city was founded in 1764 and was called Angostura. The name was changed in 1819 to its present one in honor of Simon Bolivar. Pop. 12,000.

Ciudad De Cura, dā koo'rā, or **Cura,** Venezuela, in the state of Guzman Blanco, southwest of the city of Caracas, about 20 miles east of Lake Valencia. It is a 17th century city, but many of its new buildings are modern in style and beautiful in architecture. The streets are broad, many small parks adorn the city, and the inhabitants are justly proud of their library. Pop. 12,200.

Ciudad Juarez, hoo-ä'reth (formerly EL PASO DEL NORTE), Mexico, state of Chihuahua. It is on the Rio Grande River, opposite El Paso,

Texas, on the Mexican Central R.R., about 210 miles north of Chihuahua, the capital of the state. Altitude about 3,800 feet, country around fertile and producing fruit, grains, and vegetables. Cattle are shipped to various parts of the United States. It has a Mexican custom-house and an army post. A United States consul is stationed here. Pop. 7,200.

Ciudad Porfirio Diaz, pôr-fē'rē ō dē'äth, Mexico, town in the state of Coahuila, on the Rio Grande, opposite Eagle Pass, Texas, on the Mexican International R.R., and is the Mexican terminal of the international bridge across the Rio Grande. It has a custom-house, army post, large cattle markets, and but poor buildings for the storage of fruits or grains. It is situated in an agricultural region, and its trade with the United States consists chiefly in exporting grains, fruit and cattle, and in importing manufactured articles. Coal beds near are of value and may cause the establishing of manufactories. It was founded in 1849. Pop. 5,200.

Ciudad Real, thē-oo-däd' rā-äl', the name of a province of Spain, occupying the south extremity of New Castile, and of its capital. The area of the province is 7,620 square miles. The surface in general is bare-looking, immense plains stretching from the mountains of Toledo to the Sierra Morena. The mountains of Ciudad Real abound in minerals: iron, silver, copper, lead, antimony, cinnabar, and coal; also in quarries of marble, jasper, quartzite, granite, etc. Medicinal and mineral springs, both hot and cold, are abundant. The climate is dry, and in the heat of summer very oppressive. The plains and valleys are productive in the vicinity of the rivers; in favorable seasons good crops of cereals are obtained. Cattle, sheep, mules, etc., are reared. Woolen, linen, and other fabrics, hardware, earthenware, esparto, etc., are manufactured; brandy, wine, and oil of good quality are made. Metals, manufactured goods, brandy, wine, and oil, horses, mules, and cattle are exported. The city of Ciudad Real is situated on a low plain near the Guadiana, 100 miles south of Madrid. The walls are in many parts ruinous. The principal edifices are the Church of Santa Maria del Prado, consisting only of a single nave, but so grand and lofty that no other in Spain, except the cathedral of Coria, equals it; the hospital; the institute, with a good laboratory and botanic garden. The manufactures and the trade are of little importance — the former in woolen and linen cloths, the latter in grain, wheat, wine, etc. Pop. about 15,000. Pop. of the province (1900) 321,580.

Ciudad Rodrigo, rōd-rē'gō, Spain, a fortified town in Leon, on the river Agueda, about 55 miles south-southwest of Salamanca. There is a castle dating from the 13th century. The cathedral was begun in 1190 and contains many interesting features. Ciudad Rodrigo was a place of considerable importance in early Spanish history as a frontier fortress. It was taken by the English in 1706 during the war of the Spanish Succession, and recovered by the Spaniards in 1707. The fort was surrendered to the French under Masséna, 10 July 1810, having been bombarded 25 days; and 19 Jan. 1812, it was taken by storm by the British under Wellington, after a siege of 11 days. The Cortes bestowed upon Wellington the title of Duke of Ciudad Rodrigo. Pop. 8,000.

Ciudad Victoria, sē-oo-däd' vīk-tō'rē-ä, Mexico, capital of the state of Tamaulipas, on the main line of railroad which runs from Tampico to Monterey, about 100 miles from the Gulf coast. It is in a sugar and fruit-growing region, but the sugar only is exported. It is an episcopal see and the residence of a consular agent of the United States. The city was founded in about 1750. Pop. 14,800.

Ciudadela, thē-oo-dā-dā'la, Spain, a city and seaport on the island of Minorca, at the west side. It is surrounded by walls and a ditch, and has a cathedral, municipal buildings, hospital, cemetery, and several convents. The inhabitants are engaged in weaving woolen fabrics, expressing oil and wine, and in husbandry. Pop. 8,447.

Civets, a family of small carnivorous mammals, the *Viverridæ,* related to both the hyenas and the cats. Their alliance to the former appears when the fossil history of the family is traced back to the early Tertiary, where the ancestry of both converges. The comparatively coarse hair, erectile mane, possessed by some species, and dentition, are still hyena-like; while the slender, elongated form, long tail, and especially the fact that the claws are semi-retractile, exhibit the inborn likeness to the cats. The civets vary from two to three feet in length, and most of the species are strongly marked in black and white stripes and spots, sometimes prettily disposed. They are distributed throughout the warmer parts of the Old World, abounding in Africa and the Malayan Islands, but are absent from the Australian region. The family is divisible into two groups, one of which includes the typical civets; the African genets (q.v.), one species of which also inhabits Spain and Italy; the linsangs and other Oriental spotted forms, and the paradoxures. The second group includes the mungoos and other ichneumons, suricates, and the like. These various forms will be found described elsewhere under their separate names.

Civets feed upon smaller mammals, birds' eggs, lizards, and snakes, and are considered beneficial because of their appetite for crocodile eggs, which they devour in great quantities along the Nile. They are characterized by, and chiefly valued for, an odorous, fatty substance, contained in a pouch connected with the sexual organs, in both sexes. This substance is used for compounding perfumes, and is ready for use after it has been drained, washed and dried. It is called "civet." A dram is obtained at a time from each animal, from which it is taken at intervals of a few days. Many thousand ounces are annually imported into London. Pure civet is valued at about $10 an ounce. The American "civet-cat" is the cacomistle (q.v.), which is not a true civet, but nearly related to the raccoons.

Civic Crown, among the Romans, the highest military reward assigned to him who had preserved the life of a citizen in battle. It bore the inscription *Ob civem servatum,* that is, "for saving a citizen," and was made of oak leaves. He who was rescued offered it, at the command of his leader, to his preserver, whom he was bound to honor afterward as a father. Under the emperors it was bestowed only by them. The person who received the crown wore it in the theatre, and sat next the senators.

When he came in all the assembly rose up as a mark of respect. The senate granted to Augustus, as a particular mark of honor, that a civic crown should be placed on the pediment of his house, between two wreaths of laurel, as a sign that he was the constant preserver of his fellow-citizens and the conqueror of his enemies. Similar honors were also granted to the Emperor Claudius.

Civics, the science which deals with the theoretical and practical aspects of citizenship; the duties of citizens to each other as fellow members of a body politic, and to the government. In its broadest aspects it includes civil law, political economy, and finance, as well as social ethics, governmental methods, and the history of social and political development; but the first three are counted as separate sciences from their extent and specialty, and civics proper is concerned with the last three. This is becoming a recognized study in the schools and colleges of the United States.

Cividale, chē-vẹ-dä'lā, Italy (the ancient FORUM JULII), a town of Venetia, in a basin of the Julian Alps, eight miles east-northeast of Udine. It consists of the town proper, surrounded by walls and ditches, and of fine suburbs; and has among its edifices a large cathedral of the 15th century, with three Gothic portals, a curious baptismal font, and several fine paintings; a museum of antiquities, and a record office with some very ancient charters. The neighborhood abounds in interesting antiquities. Pop. about 9,000.

Civil Action, an action brought in the civil courts for the recovery or protection of private or civil rights, or damages for their breach. The two great classes into which actions are divided are civil and criminal. In civil actions either a government or a private individual may be plaintiff or defendant; while criminal actions are always brought in the name of the government.

Civil Damage Acts, legislative acts passed in several of the States, giving to husbands, wives, children, parents, guardians, employers, and others who have sustained injury in person or property or means of support, by an intoxicated person in consequence of such intoxication, the right of action against the person who sold or gave away the liquor which caused such intoxication. Such acts have been held to be constitutional. In some cases the right of action has been extended to the owner of the premises where such intoxicating liquor has been obtained.

Civil Death is where a person, although possessing natural life, is on account of some crime for which he has been convicted, sentenced to life imprisonment, and thereby lost all his civil right, is considered in law, dead. In some jurisdictions a person convicted of murder and sentenced to life imprisonment is considered in law as dead.

Civil Engineering. See ENGINEERING, CIVIL.

Civil Law, The. 1. *Introduction.*— The term Civil Law (*Jus Civile*) is commonly and popularly used in several distinct senses. Thus we distinguish it on the one hand from the *Jus Gentium* and on the other hand from the *Jus Naturale.* Again our municipal law is called the civil law, and further we distinguish between civil and criminal law on the one hand and civil and canon law on the other. But it is here used as referring to the whole body of Roman law (the *Corpus Juris Civilis*), having its proper origin contemporaneously with the genesis of the Roman state, and coming down in ordinary generation, from century to century, through the regal period, the republic, and the empire to the codification of Justinian and Napoleon.

When we speak thus of the Civil Law we mean the whole system of usages and rules of private law adopted by the Roman people; their *jus privatum* as opposed to their *jus publicum* (including criminal and sacred law). The *Corpus Juris Civilis* as left by Justinian was the result of a gradual modification and enlargement of the code of the XII Tables under three great influences— the Jurisconsults, the Prætors, and Legislation. The institutional definition of the *jus civile* as the peculiar law of Rome, in contrast with the *jus naturale* and the *jus gentium* is a mere philosophical flourish; by late writers *jus civile* was confined to the *responsa prudentium* alone; what the Roman jurists had chiefly before their mind when they used the expression was the old law of the XII Tables, as contrasted generally with the newer development of the *jus honorarium* (Hunter, Roman Law, 24).

Thus the Roman law presents two aspects, each perhaps equally deserving the attention of the student of jurisprudence. From one point of view it furnishes the sound and scientific basis of the greater part of the modern law of all civilized mankind, and has long proved an inexhaustible storehouse of legal principles. On the other hand, it forms a connecting link between the institutions of our Aryan ancestors and the complex organizations of modern society. In its ancient records it takes us back to the very inception of civil jurisdiction, and tracing it down for more than 2,500 years from the Rome of Romulus and Servius Tullius, we see it constitute a legal development not matched in the history of the law of any other people. The oldest fragments of the Roman law that have come down to us are ascribed to the period of the kings, but these are essentially traditional and practically insignificant, and we take the XII Tables as the first solid ground in the history of the Civil Law.

2. *The Law of the XII Tables.*— About the year 450 B.C. a commission from Rome visited Greece for the purpose of collecting information necessary to draw up a written code of laws. This fact suggests a foreign or Greek extraction for at least a part of the oldest body of Roman law, although it must of course be conceded that the XII Tables undoubtedly contained much law of indigenous growth. Three centuries had intervened between the founding of the city and the promulgation of the law of the XII Tables. During this period a certain body of local, customary law had inevitably developed, some part of which must have been incorporated into this first written code. Until the time of Diocletian (245–313 A.D.) professional lawyers, strictly so called, were not known in Rome. The business of practising law, so to speak, had been up to that time regarded as a public office, which each citizen might be called upon to undertake; but about that time there began to grow up in Rome a class of men among the patricians who made it their busi-

ness to know the law. Pomponius in his history of the Roman law, written about the middle of the 2d century A.D., informs us that the custody of the XII Tables, the exclusive knowledge of the forms of procedure and the right of interpreting the law belonged originally to the College of Pontiffs, a patrician order, at the head of which was an officer known as the Pontifex Maximus, from which office it may be remarked in passing, indirectly and by a strange and circuitous devolution has come down to our day the office of the Pope in the Roman Catholic Church. Only a small part of the language of the substantive law of the XII Tables has been transmitted to our time. Some learned attempts have been made to patch out the substance of each table, but it is by no means certain that the exact fragments of any part of the XII Tables have come down to us in their precise original form and expression. The language has probably been essentially modified by the subsequent Latin usage and by repeated transcription; and the fragments have had to be picked out and pieced together from numerous references in the later literature, as for example from Cicero, Dionysius and Gaius; so that, as matter of fact, what passes for the substance of the XII Tables is probably largely a speculative patch-work, and in its content and significance certainly more or less misleading.

3. *The Jurisconsults and the Prætors.*— The Jurisconsults, a professional class of jurists or legal writers dating from the century before Christ, were given by Augustus an authority and standing which they had not theretofore possessed, and from his time much weight is to be attached to the opinions and writings of the more eminent of them. In 426 A.D. Valentinian enacted a law, commonly called "the Law of Citation," providing that the writings of only five jurists,— Papinian, Paul, Gaius, Ulpian, and Modestinus, should be quoted as authorities. If a majority of these held one opinion, that was to bind the judge; if they were equally divided, the opinion of Papinian was to be adopted. The great bulk of Roman law as it has come down to us, and all that is most valuable in it, is due to the jurisconsults. The Prætor stood in Roman law midway between the jurisconsults and the legislature. At first there was but a single Prætor, but later a Prætor-Urbanus and a Prætor-Peregrinus (when the empire extended beyond Italy, the number being increased to 18), dividing the jurisdiction among them generally either along the line suggested by their names, or territorially. The Prætor exercised a qualified or limited legislative power. His right to alter the law was conceded, but it was not unlimited. He was in some sort the Chancellor, the keeper of the conscience of the Roman people, or the person who was to determine in what cases the strict law was to give way to natural justice (*naturalis æquitas*).

4. *Legislation.* — To give an adequate account of Roman legislation would be to write the constitutional history of Rome, something quite beside the purpose of this article. It is important, however, to state that during the republic the popular assembly was the foundation of legislation. During the earlier part of the empire the function of the popular assembly was gradually usurped by the Senate, acting more and more as the mere mouth-piece of the emperor. Finally even this form was dropped, and all enactments were made directly by the emperor. During the republic three assemblies of the Roman people existed,— the *Comitia Curiata*, a patrician body, the *Comitia Centuriata*, composed both of plebeians and patricians — the franchise being on the basis of a property qualification — and the *Comitia Tributa*, which was based on a local division of the people of the city — the vote being given territorially, as if by arrondissements, cantons, or wards. The sovereign power was exercised by the emperors in three ways,—(1) by direct legislation (*edicta, constitutiones*); (2) by judgments in their capacity as supreme judge (*decreta*); and (3) by *epistolæ* or *rescripta*, giving instruction on questions of law in answer to applications from the judges.

5. *Codification.*— The earliest collection of law in Rome was the *Jus Papirianum* of the regal period (*temp.* Tarquinius Superbus), and it was not until 304 B.C. that the full knowledge of the law was wrested from the patricians. The constitutions of the emperors were collected at different times and constituted the first codes. The oldest collection in the form of a code is the *Codex Gregorianus et Hermogenianus*, which covers a period of 200 years from Hadrian to Constantine. Only fragments of it remain. Next we have the *Codex Theodosianus*, made about the year 435 A.D. The Theodosian Code has small pretensions to scientific classification, but it runs to 16 books and has come down to us almost complete. The reign of Justinian (527–565 A.D.) marks the culminating period of Roman law. In collaboration with Tribonian, he prepared, or caused to be prepared, a complete codification of the whole body of the law, first appointing a commission of 10 members to draw up a Code along the general lines of the Theodosian Code. This is called the *Codex Vetus*, which was speedily superseded by a later edition and has been entirely lost. Next, about the year 530 A.D., Justinian created a commission of 16 members to collaborate with Tribonian in a codification of the vast accumulation of law that had grown up under the hands of the Jurisconsults and the Prætors. The commission had to deal with the works of 39 jurists, consisting of 2,000 books and 3,000,000 verses. This matter was finally sifted and reduced to 50 divisions or books, and constitutes what we know as the Digest and the Pandects. For the purpose of providing an elementary or preparatory text-book of the law, a commission was further constituted by Justinian, which prepared the Institutes of Justinian, which are in some sort a little more than a revision or a new edition of the Institutes of Gaius. After publishing the Pandects and the Institutes in 534 A.D., a commission was appointed to revise the old code and to incorporate the new constitutions and decisions. This revision was completed in the same year, and promulgated on 16 Nov. 534 A.D. Laws of a permanent character, subsequent to Justinian's codification, were collected from time to time and called Novels.

6. *The Justinian Law in the West.*— Upon the fall of the Western Empire and the subsequent local disorder and social disintegration throughout western Europe, the civil law fell into disuse in the West, and during the Middle Age was largely lost sight of; but in the 12th century the study of the Civil Law was revived at Bologna and spread thence throughout Italy

and into France. In 1453, about nine centuries after Justinian, Constantinople was taken by the Turks and the Eastern Empire was overthrown. During some five centuries, or more than half of the existence of the Eastern Empire after Justinian, the law nominally remained as settled by Justinian's legislation, modified indeed by subsequent novels of the emperors; but about the end of the 11th century the Justinian Code fell into abeyance without special abrogation. The great causes of its decay were the change of language from Latin to Greek, the accumulation of fresh law and of commentaries, the authorized readjusting of the whole by several of the later emperors, and the overpowering influence of the ecclesiastical or the canon law. The revival of the study of Roman law and the rise of the Bologna school, were formerly erroneously attributed to the alleged discovery of a manuscript of the Pandects at the sack of Amalfi by the Pisans in 1137; but it has recently transpired that the study of the Roman law had begun to be pursued with ardor at Bologna and elsewhere in Italy long before that time. However, the manuscript in question, now called the *Pandectæ Florentinæ*, taken to Florence on the conquest of Pisa in 1406, is well known; it is a very ancient and valuable copy of the entire Pandects, being also the only one in existence that dates before the age of the Glossators. The fame of the school at Bologna spread throughout Europe, attracting crowds of students from all quarters and reviving a vivid interest in the Civil Law.

About 1135, or a little earlier, the code of Justinian was translated into French, and by the 13th century many French translations had been made of the Digest, the Institutes, and the Code. By the 12th century ecclesiastical councils had begun to forbid ecclesiastics to study the secular law (Rheims, 1131; the Lateran, 1139; Tours, 1162). This ecclesiastical inhibition served somewhat to check the study of the Civil Law at Paris — then as now the chief university town of Europe — and was favorable to the continued predominance of Bologna as the seat and centre of civil law study, to the growth of the Montpellier School, and to the establishment of new schools, the chief of which were at Toulouse and at Orleans. All these great schools in France — except Paris — and the numerous schools that sprung up in the succeeding centuries, taught the Civil Law on the basis of the Justinian text. After the spread of the scientific study of Justinian's works from Bologna to Montpellier and other parts of France, the Justinian law in the 12th and 13th centuries gradually replaced the ante-Justinian, as being the more perfect form of the Roman law. In 1250 France was still divided under two laws; in the south (*pays de droit écrit*) the Roman law obtained, modified by local customs; in the north (*pays de coutume*) local customs prevailed, slightly modified by Roman law, which, however, was taught in the northern schools and left numerous traces in the legal works of the period. A Dutch school of jurists arose toward the end of the 16th century at the University of Leyden. So, too, in Germany some progress was made in the study of the Justinian law. Like the jurists of other countries, those of Germany were impressed by the superiority of the Roman law to their native law, both in form and substance, and their admiration induced them by degrees to put it forward in practice. The influence of the Bologna revival extended into Spain, where a crude codification was effected as early as 1263, called *Siete Partidas*, but not generally adopted throughout the kingdom until about the reign of Alonzo XI. in 1348. The Roman law worked its way into Scotland by way of France. From the close alliance that so long subsisted with France, Scotland, besides borrowing many of its institutions from that country, also "imported a large portion of Roman jurisprudence to make up the deficiencies of a municipal law, long crude and imperfect, and which had made little progress as a national system till some time after the establishment of the Court of Session in 1532 by James V., after the model of the Parliament of Paris. . . . Properly speaking, the teaching of the civil law commenced in Scotland at the Reformation in 1560"; after which date, as well as before it, the more ambitious students of the civil law also availed themselves of the best professional teaching of the continental universities. "In Scotland a knowledge of the Roman law has always been regarded as the best introduction to the study of the municipal law. . . . All the best writers on the law of Scotland, such as Stair, Bankton, Erskine, and Bell, were able civilians; and though they have not produced separate treatises on the subject, their works abound with admirable illustrations of the Roman law, evincing great learning and research, and a familiar acquaintance with the writings of the continental jurists." (Mackenzie, Studies in Roman Law, 40–1).

The influence of Roman law on the English common law has been very differently estimated by different writers. Mr. Stubbs stands at one pole of the controversy with his eyes shut, saying, "England has inherited no portion of the Roman legislation except in the form of scientific or professional axioms, introduced at a late period, and through the ecclesiastical or scholastic or international university studies. Her common law is, to a far greater extent than is commonly recognized, based on usages anterior to the influx of frudality,— that is on strictly primitive custom." (Stubbs Const. Hist. of England, I., 10 § 8.) This is perfectly insular and manifestly untrue. The other and sounder view as here taken is presented in Reeves' 'History of the English Law,' following Guizot and Mackintosh, and more recently an equally enlightened view has been taken by Pollock & Maitland in their 'History of English Law.' The definite traces of Roman law surviving the Roman domination of the island are exceedingly slight. Selden states that the Roman law wholly disappeared in England until it was re-introduced from Bologna in the 12th century. A little before the middle of the 12th century, Vacarius, a Lombard, went over to England with Archbishop Theobald and lectured on the Civil Law at Oxford with success. Even Stubbs admits that before the end of the reign of Henry II. the procedure of the Roman civil law had become well known by the English Canonists. Henry of Bracton was the first · really scientific commentator on the law of England, and the greater and more important part of his work is little more than a transcript of the Roman law. He shows everywhere close familiarity with the *Corpus*

Juris. The Novels are not quoted, but the Institutes are referred to, and there are many quotations from the Digest and the Code, while a very large number of passages are incorporated bodily into the text itself and into the tissue of the author's commentary without any statement as to their source. From Bracton and Glanvill to Pollock & Maitland, the predominating influence of the Roman law in English jurisprudence is everywhere traceable and evident. "The English system of equity and the ecclesiastical law have been formed more or less extensively on the Roman law or on the Roman through the Canon law." (Mackenzie, 'Studies in Roman Law,' 40.)

Both in England and in Germany the influence of the Roman law was resisted and its predominance looked upon with disfavor, but it nevertheless made its way *pari passu* with advancing civilization in each country, becoming in fact and effect the substantial *corpus juris* of the one country directly and of the other indirectly. Many causes combined to open the way both in Germany and in England for the practical application of Roman law. Among them, especially in England, were the impulse given by the universities and the Oxford School of Civil Law, the recognition of the Roman law in the clerical courts, whose jurisdiction extended over a class of civil matters, and the personal influence of the higher judges, who mostly belonged to the clergy, and were therefore versed in the Roman law. Above all, however, was the necessity of supplying the defects of the common law, which had become manifest from the growth of trade, the increase of intercourse, and the greater importance of movable property; for the common law had expended its best energies in the completion of the legal constitution of the feudal system, and had showed no tendency toward creating an original commercial law. To these causes must also be added the scientific superiority of the foreign law with its completeness, over the domestic law with its want of theoretical development. Even at an earlier period it is not improbable that the Roman law had been used as an assistant and complementary authority in the Curia Regis, upon which court it was incumbent to instruct the inferior judges in regard to the law in doubtful and omitted cases. A legal principle enunciated by that court had authority beyond the particular case in which it was laid down, and became, by means of its actual use, part of the *jus non scriptum, consuetudinarium.* As Roman legal matter obtained reception, although the written sources of the Roman law were not at all received as having a legislative authority, Bracton properly included the former among the *leges et consuetudines Angliæ.* (Prof. Dr. Güterbock, *Henricus de Bracton,* etc., translated by Brinton Coxe, 60–2).

7. *Code Napoleon.*— Some steps were taken during the reign of Louis XIV. looking to a codification of the French law. Little, however, was accomplished, and the French people owe to the constructive genius of Napoleon the present scheme of codification, which was undertaken during the consulate at his dictation, and finally completed, one code at a time, shortly after the end of his reign. The Civil Code, which was the first, was enacted and became the law of the land 21 March 1804. It was prepared by a council of jurists assigned by the First Consul to the work; but he himself took great personal interest in it, attending many of the sessions of the Commission and contributing much by his acute suggestions to the form and content of the law. With some fitness he is reported to have said, "I shall go down to posterity with the Code in my hand." This code, called at first the Code Napoleon, but now the Code Civil, has to do with the law of obligations, of persons, of personal status, and of property. It contains 2,281 sections, many of them of only a line or two in length, and is comprised in a volume of less than 350 pages. The whole body of law in France at present, substantive and adjective, civil and criminal, is comprised in eight codes, as follows: *Le Code Civil; Le Code de Procédure Civile; Le Code de Commerce, Le Code Pénal; Le Code d'Instruction Criminelle; Le Code Forestier; Les Codes de Justice Militaire.* The scope and purpose of each of these codes is generally and sufficiently disclosed by its title. This codification is supplemented by the *Lois Usuelles.* The sources of the codified law of France are: (*a*) the ancient laws of the realm theretofore in force, consisting of local customs (custom of Normandy, custom of Paris, custom of Brittany, etc.); (*b*) the written or Roman law; (*c*) such legislative enactments of the National Assembly, the Legislative Assembly, and the Convention, and such of the Decrees of the Consuls and of the Directory, between 17 June 1789 and 15 March 1803, as were thought by the codifiers to be of permanent value; and (*d*) such general laws as have been enacted since 21 March 1804. The Roman law constitutes the foundation and groundwork of the structure, the other constituent elements indicated being merely subordinate or ancillary.

8. *The Extent of the Civil Law Throughout the World.*— The civil law in its modernized form and substantially as enacted in the Code Napoleon has, within a century past, become the law of more than three quarters of civilized mankind. To be more exact, it is thus the law not only of France and of all her colonies, but also of Italy, Greece, Switzerland, and all the minor countries of southeastern Europe, of Spain and Portugal, Belgium, Holland, and her colonies, of Austria-Hungary, Germany, Norway and Sweden, Denmark, Russia, Mexico, together with all the countries of Central and South America — all of the Western Hemisphere from the Texas border to Cape Horn — of Scotland and the Philippine Islands, the West Indies, and Louisiana, of Egypt, of all the other civilized parts of Africa, and of a majority of the more important British colonies, to-wit: Quebec, Ceylon, British Guinea and other English possessions in Africa, and Australasia. It is also working its way into Turkey and her dependencies. The German empire in 1900 adopted for the empire the Prussian Code, which is a Germanized version of the Code Napoleon; and Japan, as part and parcel of her scheme of civilization, has within recent years enacted a code of law on French lines, following closely even its minor details, thus writing the law of Rome — the Codes of Justinian and of Napoleon — into the jurisprudence of the remote islands of the sea.

9. *Resemblance Between the Civil Law and American Law.*— Aside from matters of procedure and minor detail, the actual differences be-

tween the living Civil Law as it exists throughout the world and the English common law, as refined and modified in this country and now administered here, are not great, certainly not greater than we should reasonably expect, having regard to the controlling influence,—conscious and unconscious—of the Civil Law, upon the growth and development of the common law in England, and having in mind the fact that many English judges, notably Mansfield and Holt, and several of the chancellors for the past 200 years at least, have professedly drawn copiously from the great reservoir of Roman jurisprudence, whenever occasions have arisen for modifying or extending common law principles or for applying them to new conditions of fact and circumstance. The so-called Common Law of England, certainly from the 11th century, is, in reality, largely the Custom of Normandy and the Custom of Paris, as imported at the Conquest in 1066 A.D. Its scientific terminology and its exact legal language even in its present form are essentially French. Chief Justice Holt nearly 200 years ago said: "Inasmuch as the laws of all nations are doubtless raised out of the ruins of the civil law, as all governments are sprung out of the Roman empire, it must be owned that the principles of our law are borrowed from the civil law, and, therefore, grounded upon the same reason in many things." (12 Mod. Rep. 482.) Sir William Jones, writing during the Revolutionary War, said: "With all of its imperfections, the Digest is a most valuable mine of judicial knowledge; it gives law at this hour to the greatest part of Europe, and though few English lawyers dare make such an acknowledgment, it is the source of nearly all our English laws that are not of feudal origin." And Mr. Hornblower, addressing the New York State Bar Association (1902), has just said: "It is also well for us votaries of the common law to remember that there is another jurisprudence founded upon the Roman or the Civil Law, and prevailing throughout the greater part of continental Europe, from which we have ourselves borrowed many of the most important legal principles." If we eliminate from the law of England as it obtains in this country, our technical rules of evidence, which have grown up about our system of trial by jury, our pleading and the peculiarities connected with the tenure, transmission, and devolution of real estate (which are each of them, for the most part, little more than an antiquated mass of ignorance and rubbish, of which it is the modern tendency of our American jurisprudence to relieve us), the rest of our system is not very different, at least in its elements, from modern Civil Law. The following subjects in American law may be mentioned, which have been largely influenced by the Civil Law, and resemble that system in many important elementary principles, namely, the subject of probate, of succession to personal property and testamentary capacity; the law of admiralty; the law merchant, largely of continental origin; the law of equity and trusts; the law of corporations as juridical persons distinct from the corporators; the law of *res judicata*, fully expounded in the Digest of Justinian; the theory and practice of *habeas corpus*, the leading principles of which are found in the same compilation; the law of alluvion, of accession, and of wild animals; and finally the great subject of obligations in general as arising from contract, *quasi* contract, tort, neglect, and the operation of law, the logical arrangement of which by the civilians becomes more and more useful in legal analysis and discussion. To these we may add the general doctrines of public and private international law which are mainly of continental origin. (Howe, Roman and Civil Law in America, 16 Harv. Law Rev. 342.)

10. *The Importance of the Civil Law in America.*—The present practical importance of the Civil Law to us consists in the fact that about one sixth part of the present population of the United States and its dependencies—or, to put it in figures, more than 12,000,000 of our population—live under the civil law, and are governed in their personal and property rights by some form of it. Thus Louisiana, with a population of 1,400,000, Porto Rico, with a population of 1,000,000, the Hawaiian Islands, with a population of 150,000, the Philippine Islands, with a population of 8,000,000, and Cuba (if indeed it may be included), with a population of 1,600,000, are governed by the civil law. Not only, therefore, must our judges and lawyers acquire familiarity with it and facility in working in it, but our commercial and trading classes are finding it constantly of more and more consequence to them in their business. Not only is much of our law derived from it, but many millions of our people live and must continue to live under it. It is a curious fact that the Custom of Paris was in force in Michigan and Wisconsin down to the year 1810, when it was formally abolished, in Michigan at least, by the legislature of that State. (18 Wis. 158; 8 Mich. 25.) All the French colonies established in the 17th and early part of the 18th century in North America were governed by the Custom of Paris, which still remains in Quebec the basis of the codified law of that province. By a royal ordinance the laws, edicts, and ordinances of France and the Custom of Paris were extended to Louisiana, and that system of law thus introduced prevailed there until 1763, when France ceded the country to Spain. That introduced the Spanish law into Louisiana, which was, however, only another form of the Civil Law. In 1808 a Civil Code was adopted by the Territory of Orleans based to a considerable extent on the Code Napoleon, and, as revised in 1825 and subsequently, constitutes the present Louisiana Code. We probably owe to the study of Blackstone's Commentaries much of the unreasoning prejudice which has hitherto existed to some extent in this country against the study of the Civil Law. Blackstone began to be read by law students in America about 140 years ago, and from then to now has been for the most part the initial text-book for all lawyers and law schools. He writes bitterly in his first lecture about the civil law. But it is manifest that he wrote without knowledge and under the influence of a set of political prejudices, and with a bias and prepossession with which we in the United States may well have little sympathy. Abstractly, there is no more reason why Americans should entertain a prejudice against the Civil Law than against the law of gravitation, and there are cogent reasons, practical as well as scientific, why we should—now at least when it has become a matter of real personal

concern to so considerable a part of our people — give serious attention to modern Civil Law.

Bibliography.—Ferriére, 'Coutume de Paris'; Ferriére, 'History of the Roman Law'; Flach, 'Études critiques sur l'histoire du droit romain au moyen age'; Bentham, Complete Works, Vol. I., 'Principles of the Civil Code'; Mackenzie, 'Roman Law'; Hunter, 'Roman Law, in the Order of a Code'; Hunter, 'Introduction to Roman Law'; Hadley, 'Roman Law'; Baudry-Lacantinerie, 'De droit civil'; Coxe, 'Manual of French Law'; Muirhead, 'Historical Introduction to the Private Law of Rome'; Bryce, 'Studies in History and Jurisprudence'; Howe, 'Roman and Civil Law in America,' 16 Harvard Law Review, 342, also 1 Southern Law Review, 96; Hornblower, 'Address New York State Bar Association 1902'; Beach, 'French Law and the French Judicial System,' 15 Green Bag, 33; Carpentier et Frèrejouan du Saint, 'Du droit français'; Rivière, 'Codes français et lois usuelles'; Weiss, 'Pandectes françaises'; Ruben de Couder, 'Pandectes chronologiques.'

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Civil List, a term signifying in the United States, (1) a list of the entire expenses of the civil government, (2) the revenue appropriated to support the civil government, (3) the officers of the civil government who are paid from the public treasury.

In England the meaning of the term formerly represented the whole expenses of the government with the exception of those of the army, navy, and other military departments. It is now limited to the expenses proper to the maintenance of the household of the sovereign. It was once a principle in England, as in other Teutonic nations, that the monarch was to pay all the expenses of government, even including those of the army, from the possessions of the crown, the domains, and that the subjects were not obliged to contribute anything more than they voluntarily engaged to. From this principle, which is proved by the history of the origin of the domains, it appears that the crown lands in general cannot be considered the private property of the ruling family. On the contrary, they are, in general, the property of the state, and have been given to the prince to defray the expenses of government. Until the Restoration the whole expenses of the government continued to be defrayed out of the royal revenue. The first Parliament of Charles II. fixed on £1,200,000 ($6,000,000) as the ordinary revenue of the crown in time of peace. For this they provided by taxation, which ultimately produced more than the amount of the grant. The same taxes were continued during the reign of James, and produced on average £1,500,000 ($7,500,000), besides which he received extraordinary grants. At the commencement of the reign of William, the Commons made still further restriction on the royal control of the revenue. They voted £1,200,000 ($6,000,000), as the revenue of the crown in time of peace, one half of which was appropriated to the maintenance of the king's government and the royal family, the other to public and contingent expenditure. The outbreak of war prevented this arrangement from being exactly carried out, but the Commons maintained the principle of separating the regular and domestic expenses of the king from the public expenditure, and establishing a systematic and periodical control over the latter. The amount actually voted to the king for life in 1697 was £700,000 ($3,500,000) and the same vote was made at the commencement of the reign of Queen Anne and George I. On the accession of George II. £830,000 ($4,150,000) was voted. Besides the regular vote, grants had been frequently made to defray debts incurred in the expenditure of the sovereign. On the accession of George III. the civil list was fixed at £800,000 ($4,000,000), but instead of being paid out of appropriated revenues in which the crown lands were included, these were surrendered, and it was charged on the ordinary taxation. Large extra grants had to be made during this reign. At the commencement of the reign of Victoria a civil list of £385,000 ($1,925,000) per annum was settled on her majesty for life for the support of the royal household, and the maintenance of the dignity of the crown, £60,000 ($300,000) being allotted to the privy purse. In 1901 the civil list of King Edward VII. was raised to £470,000, ($2,350,000); £110,000 of this being for the privy purse. Many continental states have a fixed civil list; that of Russia is equivalent to $7,050,000; of Turkey, $4,600,000; of Austria, $3,650,000; of Prussia, $4,500,000.

Civil Procedure. See COURT.

Civil Rights Bills. 1. An act to carry out the intention of the Thirteenth Amendment, prohibiting slavery — which it was alleged the Southern States were attempting to nullify by public and private action — and secure the political equality of the ex-slaves with the whites. It provided that all persons born in the United States and not subject to any foreign power, excluding Indians not taxed, were citizens of the United States, and entitled to the same immunities, irrespective of race or color, or previous condition of servitude, except as punishment for crime; punished as a misdemeanor any deprival of such right under color of State law; transferred cognizance of such cases from the State to the Federal courts; intrusted the execution of the act to national officers only, and fined them for refusal; punished resistance to the officers; provided for fees; empowered the President to send officers to any district where the act was likely to be violated, and to call out the national forces to execute it; but permitted an appeal to the supreme court. Significantly, it employed somewhat the same means to emancipate the negro which the Fugitive Slave Law did to re-enslave him, especially in over-riding or supplanting State officers; and for the same reason — they could not be trusted in the sections where it was to be enforced. The bill was passed in the Senate 2 Feb. 1866, 33 to 12; in the House 13 March 111 to 38. Andrew Johnson vetoed it 27 March, and it was passed by the requisite two thirds over his veto, in the Senate 6 April and in the House 9 April. Even so, the debate had brought out two grave doubts of its constitutionality; that the protection of civil rights under the Constitution belonged not to Congress but to the States, and that under the Dred Scott decision (which stood as a precedent for the supreme court until reversed), negroes could not become citizens even by emancipation. This led to the proposal of the Fourteenth

Amendment (see CONSTITUTION, *Amendments*), which passed both Houses in June.

2. An act extending the foregoing to the exclusion of negroes from juries, and from equal privileges in schools, public conveyances, hotels, theatres, etc. This had been persistently urged by Charles Sumner, for some years before his death; was offered as an amendment to the Amnesty Bill of 1872, and lost by only one vote; again introduced into the House in December, and referred to a committee; on 30 April 1874, a few weeks after Sumner's death, it passed the Senate, but the House rejected it; it finally passed both Houses in February 1875 and was signed 1 March. For an account of its partial invalidation, see next article.

Civil Rights Cases. These were five test cases in the United States supreme court of the constitutionality of sections 1 and 2 of the second Civil Rights Bill, described above; decided in one group, October term, 1893, and reported and cited under the title above. All came up from circuit courts; three on certificates of division of opinion, two on appeal for error; and while the decision on the act was adverse to all, and the first three were found for defendant, the error was admitted and the decision given for plaintiff in the last two. Two of them were for hotel discrimination, two for theatre discrimination, one for railroad discrimination; the first four submitted 7 Nov. 1882, the last one 29 March 1883. The cases were: U. S. *v.* Murray Stanley, from the Kansas district: hotel case. U. S. *v.* Michael Ryan, California district; refusing a negro a seat in the dress circle of Maguire's Theatre, San Francisco. U. S. *v.* Samuel Nichols, Western Missouri district: hotel case. U. S. *v.* Samuel D. Singleton, southern New York district; refusing a negro a seat in the Grand Opera House, New York. Richard A. Robinson, and Sallie A. Robinson his wife, against the Memphis & Charleston R.R. Co.: refusal to allow the wife a seat in the ladies' car from Grand Junction, Tenn., to Lynchburg, Va. The decision of the court was given by Justice Bradley, Harlan dissenting. The terms of the first section of the act are that "All persons within the jurisdiction of the United States shall be entitled to the full and equal enjoyment of the accommodations, etc., of inns, public conveyances by land or water, theatres, and other places of public amusement," and that laws must be "applicable alike to citizens of every race and color, regardless of previous condition of servitude." The second section affixes penalties. The court held that these two sections are unconstitutional as applied to the States, not being founded on either the Thirteenth or Fourteenth Amendment (see CONSTITUTION, *Amendments*): the former merely prohibits slavery, which is not constituted by a denial of civil equality; the latter is prohibitory merely on the States, not on individuals, and it was not alleged that the discrimination was made under State laws. Congressional legislation for enforcing the latter amendment is not direct legislation, but corrective, counteracting or redressing State legislation of a sort forbidden by the amendment. For private injury from discriminations, the remedy must be sought in State laws — to withdraw it from which was the precise object of the act.

Civil Service, that branch of the public service which includes all executive offices not connected with the army or navy. The term is not applied to the direct representatives of the people, as the President of the United States or the governor of a State. Owing to the complexity of modern government and the variety of its functions, the civil service has become very complex, and the problem of its effective administration a difficult one.

In Great Britain the service comprises various departments, such as the home office, the foreign office, the war office, admiralty, post-office, customs, excise, etc. Formerly, appointments to the civil service in Great Britain were the gift of the executive government, and were obtained by influence, while the bestowal of them was used as a means of gaining parliamentary support on behalf of the government. Those appointed were not generally called upon to show whether they were competent or not. In 1855 examinations were instituted to test the efficiency of all candidates for subordinate posts; but for some time candidates were specially nominated for those posts. As more than one might be nominated for a post, competition was gradually introduced, and in 1870, it was directed that appointments in the civil service should (with certain exceptions) be filled by open competition, as was already the case with appointments in the Indian civil service. The appointments to what are known as clerkships in the civil service are divided into two classes or divisions, with different age limits and salaries. In the higher division, while the examinations are more severe, the salaries are much better; the two divisions are kept quite distinct; and it is rare for a person to be promoted from the lower to the higher. For a number of appointments open to competition special qualifications, scientific or technical, are necessary, while there is also a special limit of age. A large number of subordinate appointments in the postal and telegraph service, the excise, etc., are on a different footing from the clerkships just mentioned, and are not so well paid. All persons who have served in an established capacity in the permanent civil service are given a pension, varying with the length of service, at the time of retirement. The total expenditure of the civil service of Great Britain is about $90,000,000.

In the United States the Federal civil service numbers over 100,000 officials in the various administrative departments. The Constitution provides that the President, "with the advice and consent of the Senate," shall appoint all officers of the United States whose appointments are not otherwise provided for by the Constitution. This gives the chief executive power to choose the heads of departments, as well as their subordinates. In the separate States the appointive power of the chief executive is much more limited. The heads of the State departments such as the attorney-general and comptroller, etc., are elected by the people, and usually have the constitutional right to select most of their own subordinates. The governor therefore appoints only his own secretaries, etc., members of commissions, heads of bureaus, and the like. With the development of party government in the United States, the patronage placed in the hands of elected officers through their power of appointment, has led to

the giving of offices as a reward for party service (the spoils system), and to considerable inefficiency and unnecessary expense in public administration. A reform is being brought about by the appointment of officials according to merit in public examinations. See CIVIL SERVICE REFORM.

Civil Service Reform, the improvement of the civil service in methods of appointment, rules of conduct, etc.; in the United States, the movement for the appointment of public servants according to their fitness for their work, rather than their services to the party in power.

In the year 1835 a debate took place in the Senate of the United States on the condition of the civil service, and especially on the abuse of the power of appointment and removal to serve party ends instead of public ends. Among the senators who took part in the debate were the three whom history has judged the strongest in that famous body, Daniel Webster of Massachusetts, Henry Clay of Kentucky, and John C. Calhoun, of South Carolina. Differing widely in their views of party policy and rivals in ambition, they were of one mind as to the true nature of the public service, and as to the errors and evils that had crept into it. Mr. Webster, then in the prime of his young manhood, had already won the title of the "Great Expounder of the Constitution." He thus stated the idea in which the others heartily joined: "The theory of our institutions is plain; it is that government is an agency created for the good of the people, and that every person in office is the agent and servant of the people. Offices are created, not for the benefit of those who are to fill them, but for the public convenience."

There is no doubt that this is indeed the true theory of our institutions. It is to be found in all the early writings of the men who formed the government. It is the basis of the Declaration of Independence, that "governments are instituted among men" to secure the rights of "the governed" from whose consent "they derive their just powers." When our national government was founded it was the only one in which offices were not a privilege, but a trust, imposed by the choice of the people and for their sole interest. Neither birth nor rank, nor wealth gave any title to them. Each of the men who held them was intended to be, in the words of Webster, "the agent and the servant of the people."

This theory had grown out of the needs of the American people, and fitted them closely. As colonists they had had to work and fight hard for the right to live and the means to live as free men in a wild land, far from the homes of their fathers, amid many perils and hardships. There was no ruling class among them. To attend to the common business of each little settlement, they were led to choose among their own number the agents best fitted for the task. These in the early days were, as in the towns of New England they still are, "select-men," "trustees." The name shows what was expected of them, and what was their title to employment. As the towns were grouped in counties and the counties in States, the public business grew, became more complex, and required a larger number of agents with different duties and powers, but the idea held. They were still agents, selected men, trustees. From the most modest unpaid village or town officer to the President of the United States, the Commander-in-Chief of the army and navy of the nation and its representative in the eyes of the world, no man in the public service in this country is anything but the agent, the trustee of the people.

One result of the growth of the public business has been that only a small part of the agents for doing this business, are chosen directly by the people. Those thus chosen are entrusted with the employment or appointment of a very large number of others. The chief difference between the two classes is that those elected are expected to carry on the public business in a way that the majority of the voters are in general agreed upon. They are the choice of the majority party and, so far as the rights of all permit, they are the agents of that party. When the views and wishes of the majority change, these agents are usually changed also. But the far greater number of agents for doing the public business are appointed or employed. The duties of nearly all these are the same no matter what may be the policy of the majority party. In the national government, for instance, the main work for those in office, except the highest, is the collection and expenditure of the taxes. The taxes are collected on goods brought into this country for sale or on goods made here for sale; in other words, customs, duties, and internal revenue taxes. Parties differ widely as to which class of taxes should be the higher, and as to how high the custom duties should be. But all parties agree that the taxes of all sorts should be collected according to law, honestly and fairly, that the money should be carefully accounted for, and none of it stolen or wasted. Agents for this purpose need to be good business men of character and ability; they do not need to be of one party or another. Again, the Post-office Department does a great part of the business of the government. It collects mail matter of all kinds, transports it, delivers it at home or abroad, makes large payments on money orders, and sells the stamps by which the cost of its work is paid. As to this work, there is no difference at all between parties, and there has never been. The agents engaged in it need only to be honest and efficient. They do not need to be of one party or another. In all offices where the duties are of this sort, it is plain that those engaged in them should be selected for merit only, promoted as the service requires, and removed only for failure or incapacity to do their work in the best manner.

Such a policy would answer to Webster's statement of the theory of our institutions, and to the practice of the early Presidents. Washington declared: "In every nomination to office I have endeavored, so far as my own knowledge extended or information could be obtained, to make fitness of character my primary object." In the first 39 years of the history of the government the six Presidents made only 112 removals. A few years later, when Webster had to define anew the true theory of the public service, a very different practice had grown up. It was frankly described in that same debate by Mr. Marcy, a senator from New York. He said: "The politicians of the United States are not so fastidious as some gentlemen are as to disclosing the principles on which they act. They see nothing wrong in the rule that to the victor belongs

the spoils of the enemy." This theory is plainly the opposite of the true one. Under it elections do not merely settle the policy of the country, as to which parties may unselfishly differ. They become contests for spoils as well, and tend to become more and more contests for spoils and less disputes as to principle. The spoils are the offices, the places of trust, and these tend to be given not to those best fitted to perform their duties, but to those who have claims on the party. The service is hurt by putting out tried men and putting in untried men, and since the untried men are chosen for other reasons than fitness, they are apt to be poorer officers. Since they owe their employment to party favor, and do not get it on their merits, they are likely to be less faithful and less honest. They are liable to be turned out at the next election, and they are tempted to make all they can from their places. The offices tend to be regarded as created not "for the public convenience" but "for the benefit of those who fill them." The service tends to become poorer, less honest, more costly. Any large private business conducted in this way would surely come to disaster. So would the business of the government if it had not the pockets of the taxpayers to draw on.

The Spoils System.—The spoils system prevailed in the service of the United States government for about a half-century after 1830. It also prevailed in greater or less degree in the service of the several States and of the larger cities. It was not confined to any one party. All were more or less corrupted by it. The effect on the politics of the country was very bad. The pressure for public employment, always strong, became extreme. Probably the election of 1860 was as largely decided by moral conviction as any in the history of the country. Yet, one month after he took office, President Lincoln groaned under the burden of this pressure. "I wish," he wrote, in his simple phrase, "I could get time to attend to the Southern question. I think I know what is wanted, and believe I could do something toward quieting the rising discontent, but the office-seekers demand all my time. I am like a man so busy letting rooms in one end of his house that he cannot stop to put out the fire that is burning in the other." In the crisis of the war for the Union he was visited by a committee of New York politicians, intent on patronage. The chairman opened his address with a reference to the "awful burden of the nation's fate weighing on the president." "Gentlemen," interrupted Mr. Lincoln, "it is not the fate of the nation that worries me most just now; it is your pesky post-office." These incidents throw a strong light on the waste of time, of money and of strength imposed by the spoils system. The degradation and pollution of politics were even worse effects. The office-holders, living on the spoils of the place, and greedy for more, seized the organization of their party, whichever it happened to be, and made the free exercise of honest preference among the voters difficult and often impossible. The scramble between factions in the party in possession became as intense as between opposing parties. In the Custom House in New York, five collectors of the same party made 1,878 removals in a period of 1,565 business days, and the service grew steadily worse. In 1881, Guiteau, an office-seeker from New York, where a bitter factional fight had long been raging, half-crazed with disappointed greed, assassinated President Garfield, to whom he charged his failure.

The Merit System.—This proved the turning point. At the next session of Congress bills were introduced for the establishment of the merit system, and a law was passed in January 1883. It was entitled "An Act to Regulate and Improve the Civil Service of the United States." The object of the law was to secure appointment and promotion in the service for fitness. For this purpose appointments were to be made from those graded highest as the results of open competitive examinations, the appointments being made final only after a period of probation or trial. This system was to be extended throughout the service as fast and as far as the President should direct. When any part of the service was to be brought under the system, it was to be arranged in classes by order of the President; hence the term "classified service" means, under the law, the part of the service in which the merit system is applied. Within the classified service, the examinations for appointment and for promotion are chiefly competitive; that is to say a list, called an "eligible list," is made of all applicants passing a fixed grade, in the order of their standing, and a selection is made by the appointing officer from the three highest on this list. This selection is for the period of probation or trial, six months, at the end of which term, if his conduct and capacity are satisfactory, the probationer is absolutely appointed; if not, he is discharged. Non-competitive examinations are held according to the rules laid down by the President. In these all applicants passing a fixed grade are eligible to appointment without regard to their relative standing. The rule as to probation is the same as in the other cases. The law requires that all "examinations shall be practical in their character, and as far as may be shall relate to those matters which will fairly test the relative capacity and fitness of the persons examined to discharge the duties of the service into which they seek to be appointed." Close attention is paid to this requirement. In the first place, weight is given to the experience of the candidates in the kind of work they seek, when such experience can definitely be known. Then each class is tested as to the knowledge and skill particularly needed. For clerks and accountants, weight is given to accuracy and quickness in figures, to clearness and rapidity in writing, and to familiarity with the principles and methods of bookkeeping. Examinations are generally for entrance to the lower grades of the service, and actual excellence in the performance of work counts in promotion. For places requiring special knowledge, trained examiners are employed. For instance, the examiners who set the questions and rated the answers in the case of the supervising architect were prominent architects from various parts of the country. They were able, from the records of the candidates, to test not only professional knowledge, but business capacity. In all cases the examiners are selected from those who are well informed as to the work to be done. The application of this law is to be carried out and watched by a commission, known as the United States Civil Service Commission, made up of three members,

appointed by the President with the advice and consent of the Senate. This commission aids the President in the formation of the rules under the law, and, with the aid of examiners, sets and conducts the examinations. All appointing officers are required to report to it all changes in the classified service, of which the commission keeps a full record, as well as of its own examinations and other proceedings. All officers of the service are required to aid in the performance of the duties of the commission.

One of the worst evils of the spoils system was the fact that public employees were made to pay a large fraction of their salaries to party funds, and another was that these employees were forced to work for the party in power in order to keep their places. Both these practices are now forbidden by law in the service of the United States. No one in the service is allowed to use his official authority or influence to coerce the political action of others. All persons in the service are forbidden to ask or receive political contributions from others in the service. Such contributions cannot be solicited in any place or building used by the government. By the rules, which have the force of law, no question can be asked of candidates for appointment as to their political or religious opinions; no disclosures of such opinions can be considered; no change of rank or pay can be made because of such opinions. Under the spoils system, the office-holder got his place from his party and was taxed heavily by his party managers. The law intends to put a stop to that; it holds the officer bound only to earn his pay by honest work, and free to spend it as he chooses. The law further holds him without fear of harm or hope of aid from outside, to do his duty to his employers, the whole people of the United States. It aims to put the people and those who work for them on the same footing that is maintained in honorable private business between employers and employed.

The merit system has been greatly extended since the passage of the law. Under President Arthur, who signed the law in 1883, some 16,000 places were brought within its provisions. The number is now over 80,000. This is nearly a half of all the places in the executive service, while the salaries paid in these places are nearly three fourths of all paid in the service. While this advance has been made there have been more frequent changes of party in the government of the country than in any like period in our history. In the five elections since 1883, four have resulted in a change of party. Each succeeding President until the present has, in the discretion which the law confides to the President only, added to the number of places removed from the spoils system. President McKinley withdrew a considerable number of places from the merit system for reasons urged upon him by the heads of some departments. The effect has been unfortunate. On the other hand, the merit system has been extended to the service in the Philippine Islands in a way that promises to make the work of governing there clean, efficient, and fair to a degree that could hardly have been looked for. In this region the bond of trusteeship rests upon our government with a peculiar and solemn obligation. The United States have taken control of the affairs of the people of these islands as the result of a war with Spain, without the assent of the people in the first instance, and against resistance by a portion of them which was overcome by arms. It would be a sore disgrace, if their affairs were not managed honestly and purely and for the interest of the governed. The merit system on the lines of the Civil Service Law has been established there, under the general guidance of an experienced and skilled examiner from Washington. As many natives as practicable are being employed. It is still too early to judge of the final outcome, but the beginning is promising.

The chief aim of the merit system is, on the one hand, to get the best service for the government — that is, for the people — and, on the other hand, to remove from the party contests of the country the corrupting influence of the vast number of business places offered as spoils to the victors. The methods of competition and probation are not perfect, and, like all other human methods, are liable to mismanagement. But they are the best that have ever been tried, and they are very effective. The test of competitive examination is shown to be thorough and practical by the fact that only a very small number of those who pass that test are dropped after probation or trial. Another proof is the much larger amount of work done by persons so selected. During 10 years before the adoption of the merit system in the departments at Washington the number of clerks increased from 3,300 to 5,523, or more than two thirds. In the 13 years after the system was adopted the number actually fell off 211, or three per cent, while the work of the departments had largely increased. Another proof of the efficiency of the system is the small number of changes that take place in it compared with those that take place in the branches of the service where the system is not yet applied.

Two facts are noteworthy with regard to the effect of the use of the merit system on partisan contests in politics. The total cost of the executive service is over $100,000,000. Of this nearly $75,000,000, or three fourths, is now paid to those employees who are under the merit system. This very large sum is no longer held out as prizes for partisan activity, or treated as the "spoils of the enemy." The other fact is that the feeling of the people that the government is theirs, and does not belong to the party in power for the time being, is greatly strengthened. The entrance examinations are held in all parts of the land, and men and women are selected for the departments at Washington with no regard whatever for their party views or the influence of politicians. This has been of great effect in laying to rest the passions bred by the Civil War, and giving to the dwellers in the South a sense of their common rights and duties as citizens of the nation. It is a great and lasting gain.

In 1884, laws for the introduction of the merit system were enacted in New York and Massachusetts, and later laws authorize the system in the service of cities in Wisconsin and Illinois. In Massachusetts and in New York the system has made much progress and the results have been good in proportion as the system has been extended and honestly and faithfully applied. But the evils of the spoils system still prevail almost without check in the service of the cities and the States throughout the country. The enormous number of

places involved are still almost wholly the prizes of party contests. The place-holders, many times more numerous than the present army of the United States, are in greater part enlisted for party rather than for public service. Efficiency, industry, and economy in the public work are hard to secure. The suppression of vice and the decent administration of the affairs of cities and States are made more difficult.

Clearly it is best that the merit system should be applied to all that portion of the civil service in which the duties are of a business nature and in which the office-holders are not called on to fix the policy of the government. There is no Democratic or Republican or Populist way of being honest and industrious and intelligent which all Americans may not use. To these qualities in their service the people have a right, and no party can claim a monopoly of them. Much remains to be done to complete the work so well begun. The men in all parties who look on public employment, not as a trust, but as the spoils of party victory, resist all advance and seek to undo what has been done. They cannot succeed if the true nature of the merit system is understood, its honesty and fairness, its high utility, and its fidelity to the fundamental principle of the free institutions of the American republic.

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Civil War in America. The number of engagements entered in the government's 'Chronological List of Battles' exceeds 2,200. An alphabetical list of battles compiled at the bureau of pensions, including such minor actions and skirmishes as seemed worthy of incorporation, contains over 6,800 separate affairs. It is therefore clear that, even in a comprehensive narrative of the War, a large number of the lesser engagements must be ignored. Merely to state strength and losses for the battles mentioned would form a lengthy statistical article. For these figures the student is referred to the separate accounts in this work of the various battles herein treated.

The Civil War of 1861–5 was inaugurated by the determination of seven Southern States to withdraw from the Union. South Carolina led by passing an ordinance of secession 20 Dec. 1860, followed by Mississippi, 9 Jan. 1861; Florida, 10 January; Alabama, 11 January; Georgia, 19 January; Louisiana, 26 January; and Texas, 1 February. On 7 February the Choctaw Nation declared its adherence to the Confederacy.

During the autumn of 1860 and the early spring of 1861 the forts, arsenals, custom-houses, and other government property in those States, with few exceptions, had been seized by State troops, and large sums were voted for arming the States, Georgia leading in November 1861, by appropriating $1,000,000. Major Robert Anderson, a Federal officer, who held Fort Moultrie on the inner line of Charleston harbor, becoming aware of active preparations for capturing that work, withdrew, on the night of 26 December to Fort Sumter in the centre of the harbor. This move hastened results. Immediate preparations were made for bombarding the fort. The first firing upon the flag was 9 January by the batteries erected against Fort Sumter, the inciting cause being the appearance of the Star of the West off the harbor. This vessel had been sent from New York with provisions for Sumter, and with the accompanying fleet withdrew without replying to the fire.

Delegates from the seceded States met at Montgomery, Ala., 4 February, and 8 February adopted a provisional government, "The Confederate States of America," and the next day elected Jefferson Davis of Mississippi President, and Alexander H. Stephens of Georgia Vice-President of the Confederacy.

On 1 March Gen. P. G. T. Beauregard, appointed by the Confederate government, was sent to Charleston and took charge of the preparations for reducing Fort Sumter. On 4 March Abraham Lincoln was inaugurated as President of the United States. On 10 April Beauregard was instructed to demand the surrender of the fort, and, in case of refusal, to reduce it. The next day Anderson received and promptly declined a demand to evacuate, and at daylight 12 April, the Confederate batteries opened upon Fort Sumter, compelling its surrender on the 14th. The expectation of a relieving fleet probably hastened this attack.

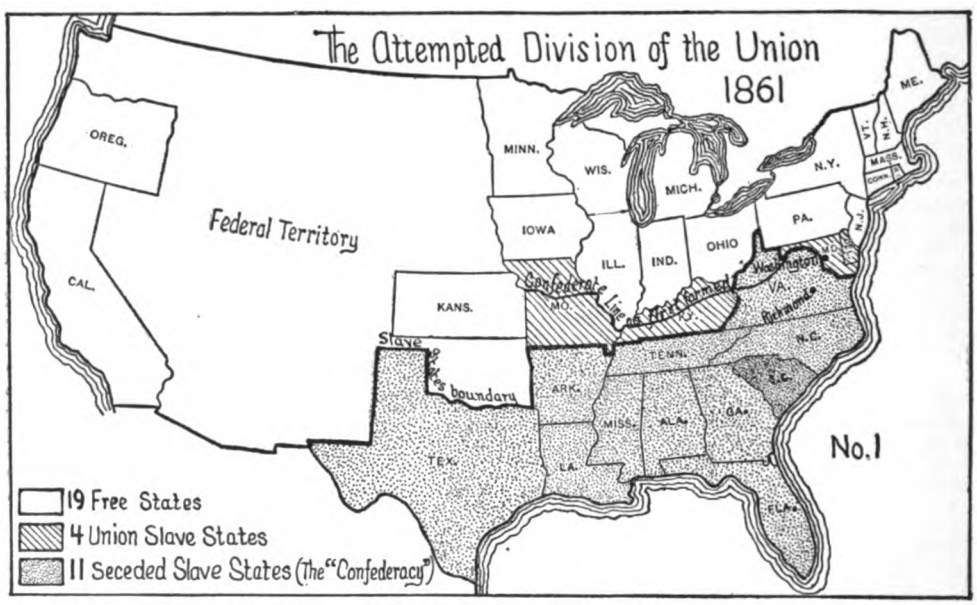
With the news of the attack and surrender the country received President Lincoln's proclamation calling for 75,000 volunteers, and summoning Congress to meet on 4 July. In an instant discussions over the power to coerce States, the discussions of peace conventions and movements, and all similar perplexing questions were brushed aside, and the North responded with intense enthusiasm, the predominating sentiment being the preservation of the Union. The South was equally aflame, rallying under the banner of State rights.

On 8 April President Davis had called for 20,000 volunteers, and the day following President Lincoln's proclamation he asked for 34,000. Two days later the Confederate Congress authorized the raising of 100,000 men. Three days after the surrender of Sumter Virginia seceded, followed 6 May by Arkansas and Tennessee, and 20 May by North Carolina, the belief being then general that a policy of coercion had been decided upon. The border States of Kentucky and Missouri were held to the Union by their loyal element, and Maryland was held at first by the direct power of the national government, and later by its own loyalty. The first two were represented in the Confederate Congress throughout the War. The movement to take Missouri into the Confederacy was thwarted by Gen. Nathaniel Lyon, who captured Camp Jackson near St. Louis 10 May, and on 17 June, having already taken the State capital, in a brief engagement dispersed a force which Governor Jackson had gathered at Booneville. This resulted in relieving the capital from those plotting secession. Kentucky at first declared for neutrality, but at the election for members of Congress, 20 June, it was made clear that the State was lost to the Confederacy. In May the Confederate capital was moved from Montgomery, Ala., to Richmond, Va., where troops from all parts of the Confederacy were rapidly assembling. In like manner, the Northern States were pouring troops into the national capital, and Washington soon became a vast military camp. The Union forces crossed into Virginia 24 May and encamped opposite Washington.

For a brief time Baltimore resisted the passage of troops to the capital. Four hundred Pennsylvanians reached Washington 18 April,

but the 6th Massachusetts regiment was attacked in Baltimore 19 April. The 7th New York reached Washington 25 April from Annapolis. Brig.-Gen. B. F. Butler, with the 8th Massachusetts, had reached Annapolis on the 20th, and on the 22d had proceeded to the Relay House. On the night of 13 May he occupied Baltimore, and thereafter the route to Washington was unobstructed. Harper's Ferry, with its arsenal and machinery for manufacturing small arms partially destroyed, was seized by the Confederates 19 April, and Gosport Navy-Yard, near Norfolk, 20 April, with guns, stores, ships, and machinery of immense value.

On 20 May Gen. Butler, having been made a major-general of United States volunteers, was assigned to the command of the Department of Virginia and North Carolina, with headquarters at Fort Monroe. On 10 June he moved against a force under Gen. J. B. Magruder at Big Bethel and was defeated. While it was comparatively a small affair, like another about



the same time at Vienna in front of Washington, both caused widespread dissatisfaction and mortification at the North.

Under President Lincoln's call Ohio promptly organized 13 regiments, and 23 April Capt. George B. McClellan was appointed major-general of Ohio militia. On 14 May he was commissioned major-general in the regular army and assigned to the Department of the Ohio, embracing that State, Indiana, Illinois, and, later, West Virginia. In May the Confederate government had despatched a small force to Grafton, W. Va., under Col. Porterfield, with the purpose of breaking the Baltimore & Ohio R.R. On 26 May Gen. McClellan threw troops from Ohio and Indiana into the State, defeating Porterfield at Philippi, 3 June. West Virginia seceded from Confederate Virginia 17 June, and set up a State government which was recognized by President Lincoln on the 26th. On 9 July United States senators were elected, and on the 13th they took their seats at Washington. Congress met in special session 4 July. It legalized all President Lincoln's acts with respect to the army and navy, and authorized a further call for 500,000 men, a national loan of $250,000,000, and an increase of the navy to render effective the blockade of the Southern ports which had been declared 19 April by President Lincoln.

Following the Philippi defeat, the Confederates sent Gen. Henry A. Wise to the Kanawha Valley, and Gen. Robert S. Garnett to Beverly. Gen. William S. Rosecrans, who was commissioned brigadier-general in the regular army 16 May, joined Gen. McClellan from Ohio, and 11 July defeated the Confederate forces under Col. Pegram at Rich Mountain. On 13 July Gen. Garnett, during the retreat of his column, was killed at Carrick's Ford. His command escaped, leaving Gen. McClellan in control of northwestern Virginia.

The latter part of July, upon hearing of the arrival of Gen. J. D. Cox of Ohio in the Kanawha Valley, Gen. Robert E. Lee was ordered to the command of West Virginia. The campaign for regaining the State failed, and by November the Confederate authorities decided to abandon the plan of occupying it. Gen. Lee was ordered to the command of the Department of South Carolina, Georgia, and Florida.

Early in July the army in front of Washington under Gen. Irwin McDowell prepared to move against the main Confederate army under Gen. Beauregard in front of Manassas. The flanks of each army toward the Shenandoah were protected by strong forces, Gen. Robert Patterson commanding on the Union side, and confronting Gen. Joseph E. Johnston.

The Union advance was hastened by an almost universal cry in the North of "On to Richmond!" Gen. McDowell left his camps on the Virginia side of the Potomac on the afternoon of 16 July with five divisions, encountering an advance brigade of Beauregard's army at Fairfax Court-House. This, with two other

brigades, withdrew with light skirmishing to the main lines, which had been established behind Bull Run, its right at the crossing of the railroad from Manassas to Alexandria, and its left at the crossing of the Warrenton turnpike from Alexandria. McDowell's forces were concentrated about Centreville on the 18th, and one brigade had quite an affair on that date at Blackburn's Ford. On the 20th Gen. Johnston arrived with all except one brigade of his army and assumed command. On the 21st McDowell, feinting in front, turned the Confederate left, and maintained a successful battle until near four o'clock, when the last brigade (three regiments) of Johnston's army arrived with a battery on the Union right and checked its advance. A brigade of Gen. Beauregard's troops moving farther to the left and more directly on the Union flank, changed this check into a retreat, which soon became a panic, and the entire Union army left the field in disordered haste. There was slight pursuit, but the panic increased, and only ended when the army was inside the fortifications of Washington. The North was astounded at the result, and the South correspondingly elated. Both sections immediately redoubled their efforts to prepare for vigorous war. Gen. McClellan was summoned from West Virginia and given command of the Department of the Potomac, and began to organize the troops pouring in from all parts of the North. On 20 August he took command of the Army of the Potomac, then for the first time organized under that title, and 1 November he was made commander-in-chief of the armies of the United States in place of Gen. Winfield Scott, who had asked to be retired on account of failing health. In the rapid organization going forward in both sections, the South had the advantage of the services of the majority of regular officers from that section who resigned their commissions and went with their States.

After Bull Run there was little heavy fighting during the remainder of 1861, both sides devoting their chief attention to establishing their lines. On 15 August Jefferson Davis ordered all Northern men to leave the South within 40 days; and the next day President Lincoln proclaimed the seceded States in insurrection and prohibited all intercourse. On the Union side, Gen. Butler in command of a joint expedition of land and naval forces, sailed from Fort Monroe, and 29 August captured the forts guarding Hatteras Inlet, opening the way to Pamlico Sound. On the lines of the Army of the Potomac the Union forces under Col. E. D. Baker, senator from California, were defeated at Ball's Bluff, 21 October, Col. Baker being killed. On 7 November a joint expedition from Annapolis, under Gen. Thomas West Sherman and Admiral S. F. Dupont, captured Port Royal, thus securing one of the most important harbors on the Southern coast. Gen. E. O. C. Ord, with a Union brigade, defeated a brigade under J. E. B. Stuart at Dranesville, 20 December. Gen. N. P. Banks succeeded Gen. Patterson in the Shenandoah; Gen. Rosecrans commanded in West Virginia.

On 29 Nov. 1861 Gen. Quincy A. Gillmore was ordered to reconnoiter Fort Pulaski, at the mouth of the Savannah River. On 1 December he reported that it could be reduced with batteries at 1,700 yards' distance, a third greater than foreign authorities laid down as practicable against permanent works. His batteries opened 10 April 1862, breached the walls within 24 hours, and the fort surrendered 11 April.

Gen. Robert Anderson was assigned to the Department of Kentucky 28 May. His headquarters were fixed at Cincinnati on account of the position of Kentucky in regard to neutrality, but on 1 September his headquarters were moved to Louisville. On 8 October Gen. Anderson's health failing, Gen. W. T. Sherman succeeded to the command of the Department of the Cumberland. On 9 November this Department was discontinued, and under the title of the Department of the Ohio, embracing the States of Ohio, Michigan, Indiana, and most of Kentucky and Tennessee, Gen. D. C. Buell was assigned to the command, which he assumed 15 November. Gen Ulysses S. Grant was ordered to the District of Southeastern Missouri with headquarters at Cairo, Ill., which he reached 4 September. On the 6th he seized Paducah at the mouth of the Tennessee, and 7 November was defeated in an expedition to Belmont. Gen. J. C. Frémont was ordered to Missouri, and assumed command 25 July. Before his arrival Gen. Lyon had moved against forces under Gen. Sterling Price with which ex-Governor Jackson was seeking to regain the State, and in the battle of Wilson Creek, 10 August, where Gen. Ben McCulloch commanded, Lyon was killed and Price occupied southern Missouri. Frémont, upon assuming command, advanced against Price, and occupied Springfield. Gen. H. W. Halleck succeeded Frémont, assuming command 19 November. Gen. David Hunter then in command at Springfield withdrew under orders, leaving the Confederates in possession of southern Missouri for the rest of the year.

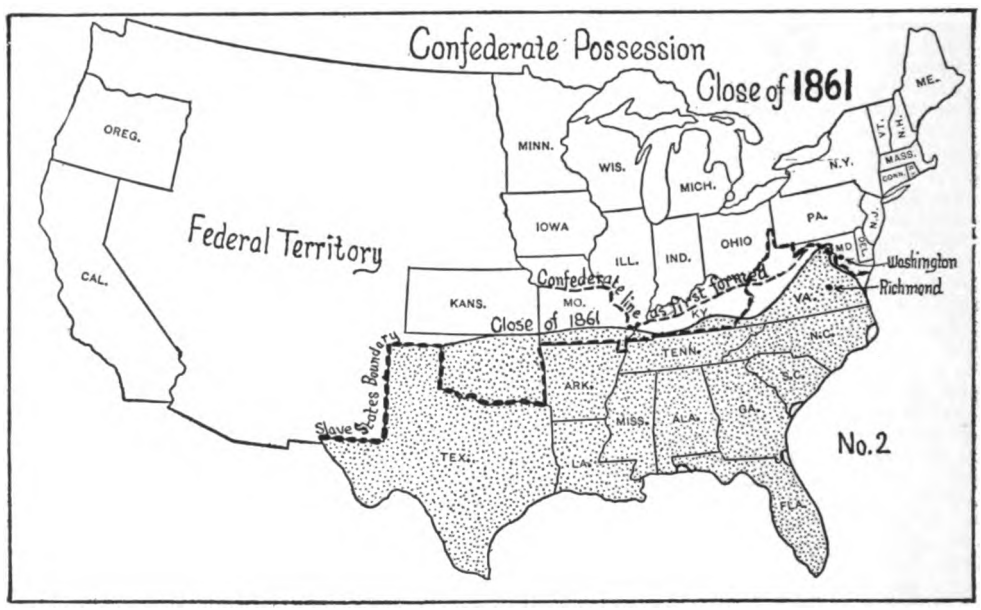
On the Confederate side, Gen. Joseph E. Johnston commanded the Army of Northern Virginia, «Stonewall» Jackson was in the Shenandoah, Gen. Robert E. Lee in West Virginia until November, Gen. Humphrey Marshall and Gen. G. B. Crittenden in eastern Kentucky, Gen. A. Sidney Johnston at Bowling Green, Gens. G. J. Pillow, J. B. Floyd, Simon B. Buckner, and N. B. Forrest at Fort Donelson, Gen. Leonidas Polk at Columbus, Ky., and Gen. Price in Missouri. Thus stood the opposing lines at the close of 1861. Half the year had been spent in establishing them. The campaigns of 1862 began early and were prosecuted with the greatest vigor on both sides.

From January to April Gen. H. H. Sibley, with Texas forces, was engaged in attempting to secure New Mexico to the Confederacy. He inflicted much loss on Union posts and commands under Gen. E. R. S. Canby, but abandoned his purpose the middle of April and retired to Fort Bliss.

On 6-8 March a severe battle occured at Pea Ridge, or Elkhorn Tavern, Ark., between the forces of Generals S. R. Curtis and Earl Van Dorn, resulting in the retreat of the latter.

As Gen. George H. Thomas was concentrating to attack Gen. Crittenden at Beech Grove, Ky., opposite Mill Springs on the Cumberland River, the latter marched at night from his entrenchments and attacked Thomas at Logan's cross roads the morning of 19 January. The Confederates were defeated, pursued to the river, and dispersed. This, with Gen. J. A. Garfield's movement up the Big Sandy, and his defeat of

Humphrey Marshall at Prestonburgh, 10 January, broke the right of the Confederate line through Kentucky. On 6 February Admiral Foote's fleet, supported by Grant's forces, captured Fort Henry on the Tennessee, and Grant's army, moving at once to Fort Donelson on the Cumberland, forced its surrender on the 16th, with about 15,000 men. Gen. A. Sidney Johnston then evacuated Bowling Green 15 February, and Gen. Leonidas Polk withdrew from Columbus 3 March, the movements of the latter being hastened by Gen. John Pope's advance on New Madrid and Island No. 10. This latter was captured 7 April. The Confederate forces in Kentucky and Tennessee then withdrew to the line of the Memphis & Charleston R.R., Gen. Johnston establishing his headquarters at Corinth. Gen. Buell, moving rapidly from Kentucky, occupied Nashville, 25 November. Gen. Johnston, learning that Buell was to join Grant, whose army had been brought from Fort Donelson to Pittsburg Landing, and was found that the Confederates had already evacuated the place. After a short pursuit, under Pope and Buell, as far as Blackland, the Union army was concentrated at Corinth, and extensive fortifications were erected. The army was soon divided, and Buell with the Army of the Ohio was sent toward Chattanooga, with orders to repair the railroad as he advanced. Gen. Braxton Bragg, who had succeeded Beauregard, proceeding to Chattanooga by way of Mobile and moving rapidly north behind the Cumberlands, compelled Buell to withdraw to the Ohio River to protect his department, which included Indiana, Ohio, and Michigan. Gen. E. Kirby Smith, at the same time, invaded Kentucky by way of Cumberland Gap, defeated Union forces at Richmond, 30 August, and threatened Cincinnati. Buell, upon reaching Louisville, advanced upon Bragg. On 8 October resulted the battle of Perryville, by which Bragg was compelled to abandon Kentucky. Passing through Cumberland Gap, he retired to Chattanooga,



camped there awaiting Buell, marched from Corinth to attack Grant before the junction could take place. The Union army was unexpectedly attacked 6 April at Shiloh Church, two miles and a half in front of Pittsburg Landing and forced back to the immediate vicinity of the landing. The advance of Buell arrived about sundown, and during the night four divisions, three of Buell's army and Lew Wallace's of Grant's, reached the field. The next day the Confederates under Gen. Beauregard, being largely outnumbered, were defeated and returned to Corinth. Gen. A. Sidney Johnston was killed near the close of the first day's fight.

Gen. Halleck arrived from St. Louis 11 April and took command. Gen Pope's army was brought from Island No. 10. On 30 April an advance began on Corinth by slow approaches. The Confederates brought Price and Van Dorn from west of the Mississippi. On 30 May Gen. Halleck's lines were close to the city, and an attack was meditated, when it was whence he advanced to Murfreesboro in central Tennessee, and went into winter quarters.

During the operations at Pittsburg Landing and Corinth Gen. O. M. Mitchell advanced with a division from Murfreesboro 5 April, reached Huntsville 11 April, and seized the Memphis & Charleston R.R. from Decatur to Bridgeport. Gen. J. S. Negley's brigade crossed the mountains and bombarded Chattanooga 7 June. Mitchell's operations drew Gen. E. Kirby Smith from east Tennessee, and left the way open for Gen. G. W. Morgan at Cumberland Ford, Ky., to seize Cumberland Gap.

In September Price and Van Dorn, who had previously joined Beauregard from beyond the Mississippi, moved against Grant and Rosecrans in the region of Corinth. Price was defeated by Rosecrans 19 September, at Iuka, and Van Dorn, supported by Price, 4 October, at Corinth. From this campaign Rosecrans was sent to relieve Buell in command of the Army of the Cumberland, then styled the Fourteenth

corps. On 30 October Gen. Rosecrans relieved Gen. Buell, and concentrated his army at Nashville. On 26 December he moved toward Murfreesboro to attack Bragg. The battle began on the last day of the year, and continued during the days of 1–2 Jan. 1863. Gen. Bragg retreated the night of 3 January, eventually taking up positions at Shelbyville, Tullahoma and Wartrace. Gen. Rosecrans occupied Murfreesboro. The respective armies remained on these lines until Rosecrans' advance in June 1863.

While Rosecrans was succeeding at Murfreesboro, there was a noted Confederate victory at Galveston. Gen. Magruder, with a fleet of ordinary river boats, protected with hay and cotton bales, captured the Harriet Lane 1 January, sunk the gunboat Westfield, and received the surrender of the forces holding the city. The Confederate Alabama, arriving shortly after, captured the gunboat Hatteras.

Both river fleets of armored and unarmored gunboats, mortar-boats, and rams were actively engaged on the western rivers. The Union fleet, Commodore A. H. Foote, was composed of 45 vessels of various classes, and 38 mortar-boats. The Confederate fleet, Commodore Montgomery, was somewhat less, but contained several formidable vessels. Commodore Foote's gunboats captured Fort Henry on the Tennessee, and played an important part at Fort Donelson, Pittsburg Landing, and New Madrid. Commodore Montgomery awaited Foote's fleet, now under the command of Commodore C. H. Davis, before Memphis. The Union fleet was made up of 5 gunboats with 68 guns, and 4 rams; the Confederates of 8 gunboats with 28 guns. After a desperate battle, 6 June, against great odds, the Confederate flotilla was destroyed, and Memphis surrendered to the fleet. Davis left Memphis 29 June, and 1 July reached Young's Point, where he joined Admiral David G. Farragut's fleet from New Orleans, which had run the Vicksburg batteries.

The year 1862 opened at the east with very general dissatisfaction over the long inaction of Gen. McClellan. Gen. Joseph E. Johnston was at Manassas and Centreville with some 50,000 men, but Gen. McClellan, misled by his secret service, continually insisted that there were three times that number. The Army of the Potomac numbered fully 150,000 present for duty. The Potomac was blockaded, and the Confederate flag floated on Munson's Hill in sight of Washington. On 31 January President Lincoln gave McClellan a peremptory order to move on Manassas not later than 22 February. McClellan asked leave to present a plan of his own for a movement down the Potomac, up the Rappahannock, across to York, and thence to Richmond. While he was discussing it, Johnston, placing "Quaker guns" in his embrasures at Centreville, withdrew unmolested behind the Rappahannock to a line of works and field depot already prepared.

Just as his movement began occurred the ominous attack, 8 March, of the Confederate ironclad Merrimac, Flag Officer Franklin Buchanan, which suddenly moved out from Norfolk and attacked the Union fleet in Hampton Roads, sinking the frigate Cumberland, capturing and destroying the frigate Congress, doing much other damage, and startling the entire eastern coast. On resuming operations the next day the Merrimac was met and foiled by the Monitor, Lieut. John L. Worden, which had just arrived. The Merrimac then retired to Norfolk, being blown up when the Confederates evacuated that city, 9 May.

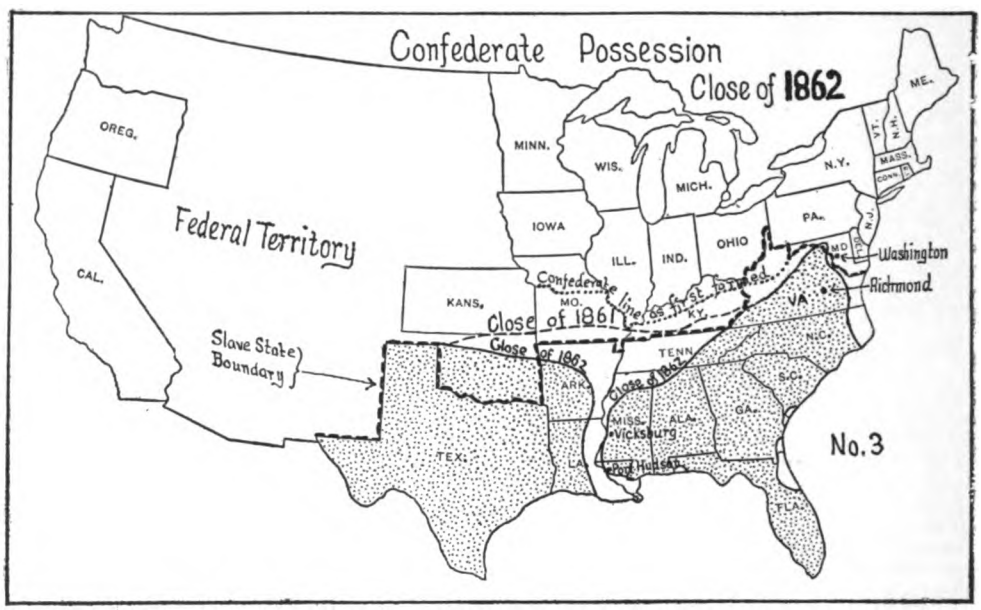
McClellan was allowed to undertake his Peninsula campaign. On 11 March he was relieved from the general command of the armies. The Army of the Potomac was transported to Fort Monroe, and the movement up the peninsula toward Yorktown began 4 April. Heavy rains caused delays from the start. It was found at Washington that the designated number of men had not been left for the proper defense of the capital. McDowell's corps was therefore retained. Arriving before Yorktown with about three times the strength of the enemy, he concluded to lay regular siege to the position. Parallels were therefore opened, nearly 100 heavy siege guns were brought up, and at the end of a month, as his batteries were about to open, Gen. J. E. Johnston evacuated the place 3 May and withdrew toward Richmond. He halted at Williamsburg, where on the 5th an unsupported attack was made upon his lines, and at night he withdrew toward Richmond. McClellan followed to the Chickahominy. On 15 May the Union fleet in the James made an unsuccessful attack on Drewry's Bluff, eight miles below Richmond. On 20 May the right of his army crossed the Chickahominy and advanced to Seven Pines, or Fair Oaks, about five miles from Richmond, where he was attacked by Gen. Johnston 31 May. The prompt advance of Sumner's corps from the other side of the Chickahominy prevented serious disaster. At the close of the day Gen. Johnston was badly wounded and carried from the field. Gen. Gustavus W. Smith commanded temporarily, and was succeeded 2 June by Gen. Robert E. Lee, who continued in command of the Army of Northern Virginia until Appomattox. On 1 June the battle was renewed by the Confederates, the troops regained their lost ground, and Lee withdrew to the fortifications of Richmond.

On 16 June the Union forces on James Island in Charleston harbor, under Gen. Benham, met with a severe repulse at Secessionville. Gen. "Stonewall" Jackson, by a brilliant campaign in the Valley, had prevented the most of McDowell's corps, then in the vicinity of Fredericksburg, from reinforcing McClellan. By moving rapidly down the Valley he defeated Banks at Winchester and forced him across the Potomac, 26 May. Returning, he defeated Gen. J. C. Frémont at Cross Keys, 8 June, on one flank, and Gen. James Shields at Port Republic, 9 June, on the other, and after a week spent in deceiving Gen. Frémont into the belief that he was about to advance down the valley, by a rapid and unsuspected movement he appeared 25 June at Ashland on the flank of McClellan's army in front of Richmond. Then followed the Seven Days' battles, beginning with Mechanicsville 26 June, and ending at Malvern Hill 2 July, whence the Army of the Potomac withdrew to Harrison's Landing on the James. The only victories of the series were the first and last battles. The Peninsula campaign had ended as a disastrous failure. Gen. McClellan had been relieved from the command of all the armies 11 March, retaining that of the Army of

the Potomac, and Halleck assumed the chief command 23 July.

Against McClellan's protest, it was decided to withdraw his army from the Peninsula to the vicinity of Washington. To cover this movement, and protect Washington, Gen. John Pope was given command of the Army of Virginia, organized with the corps of McDowell, Banks, and Frémont. Pope concentrated his army north of Culpeper, and began with his cavalry to operate toward Lee's railroad communications at Gordonsville. Lee, though McClellan's army was still within striking distance of Richmond, at once sent a portion of Jackson's and Gen. James Longstreet's corps to Gordonsville. Pope took the field 29 July, and threatened Gordonsville again. «Stonewall» Jackson advanced on the 7th, reaching Cedar Mountain on the 9th. Here Banks attacked and was defeated. Jackson retired beyond the Rapidan, and upon Lee, with Longstreet, coming up, Pope retired behind the Rappahannock. By a long battle of Chantilly. Pope then, under orders, 2 September, withdrew his army to the fortifications of Washington.

Pope was then relieved; his forces were added to the Army of the Potomac, and McClellan took command of the combined army. The first Confederate invasion of the North followed. On 3 September Lee put his army in motion from Chantilly toward the Potomac. The crossing was accomplished in the vicinity of Leesburg on the 5th, the army moving forward to Frederick, where, on the 7th, Lee issued a proclamation setting forth that his army had come to help them regain the rights of which they had been despoiled. This was coldly received. Upon learning that the garrison of Harper's Ferry had not withdrawn, he detached forces which invested and captured that place with its garrison of 11,000 men and over 70 guns. Lee, who, with Longstreet's command, had marched to Hagerstown, turned back to hold Turner's Gap in South Mountain, but was



detour, by way of Salem and Thoroughfare Gap, Jackson moved rapidly around Pope's right and 26 July destroyed his stores at Bristoe Station and Manassas in his rear, retiring to the former battlefield of Bull Run. On the 23d Reynolds' division from the Army of the Potomac joined McDowell, and on the 25th Gen. S. P. Heintzelman's corps, two divisions, arrived, and the next day Fitz-John Porter's corps of two divisions reached Pope. The battle of Gainesville followed on the 28th, resulting in the retirement of two of McDowell's divisions. At Groveton on the 29th the head of Longstreet's forces reached the field and took part in the closing fight. All the battles of the campaign had been desperately fought by both sides. On the 30th occurred the second battle of Bull Run. Pope was defeated, but withdrew unmolested to Centreville beyond Bull Run. Here he was joined by the strong corps of Sumner and Franklin from McClellan's army. A flank movement by Jackson led to the defeated on the 14th and fell back to Sharpsburg, where he was subsequently joined by the forces detached against Harper's Ferry.

McClellan advanced from Washington 5 September toward Frederick, Md., the right wing and centre passing through that place on the 13th, the right moving to Turner's and the left to Crampton's Gap. Both these positions were carried on the 14th after sharp fighting. On the 15th Lee took position on the high ground beyond Antietam Creek, and in front of Sharpsburg. Gen. Joseph Hooker's corps attacked his left toward evening of the 16th, the fighting continuing until after dark. The general engagement began at daylight on the 17th, lasting for 14 hours, the losses being greater than for any one day's fighting of the War. The advantages were with the Union army, though Lee maintained his lines during the 18th, but at night withdrew and crossed the Potomac, ending the first invasion of the North. Lee remained a month about Winches-

ter, and upon the Union Army's crossing into Virginia and moving toward Winchester he took position behind the Rappahannock.

Near Warrenton, 7 November, McClellan was superseded by Gen. Ambrose E. Burnside, under an order dated 5 November. The latter took position opposite Fredericksburg 19 November, and, 13 December, forced a crossing into the city and below it. After great slaughter, largely incurred in assaults on Marye's Heights, he was repulsed and obliged to recross the river. The next month he attempted to cross above Fredericksburg and turn Lee's left. An unusual storm made advance impossible, the army finding itself actually stalled, the movement becoming known as the great Mud March. After this failure Burnside was relieved by Hooker 26 Jan. 1863.

The navy was active and effective throughout 1862. The blockade became exceedingly stringent for the Confederacy; warlike and commercial supplies alike were very difficult to obtain. On 11 January Gen. Burnside and Commodore L. M. Goldsborough sailed from Fort Monroe, capturing Roanoke Island 5 February, Newbern, 14 March, and taking Fort Macon with its garrison 26 April.

Gen. Butler and Admiral Farragut sailed from Fort Monroe 25 February for a move against New Orleans. After a terrific engagement, participated in by Commander D. D. Porter with his mortar-boats, and in which the Confederates exhibited great endurance, the chain across the river below forts St. Philip and Jackson was cut, and 24 April Farragut forced his fleet past the forts, and after terrific fighting, during which the Varuna was sunk by the fire of the forts, appeared before New Orleans on the 25th, Gen. Lovell, who held the city with a small force, some 3,000, retiring. Gen. Butler arrived with his troops 1 May, and took full possession, taking Baton Rouge 9 May, and Natchez on the 13th, neither being fortified. Farragut's fleet then ascended the Mississippi. He ran past the batteries at Vicksburg and joined Commodore Foote's (Davis') fleet from Memphis at Young's Point. Retiring to New Orleans, thus running the Vicksburg batteries a second time, he found letters from Washington urging him to clear the Mississippi. On 25 June his fleet, with Porter's mortar fleet, was assembled at Vicksburg, and on the 28th, after a short engagement, two ships and five gunboats ran the batteries and again joined Davis' fleet above the city. On 15 July the Confederate ironclad Arkansas came out of the Yazoo, ran directly through the Union fleet, none of its vessels having steam up, and gained the shelter of the Vicksburg batteries. Farragut ran the batteries that night, and attempted to destroy the Arkansas while passing the city wharves, but failed. On 20 July his fleet was ordered to New Orleans, where it arrived on the 29th.

Grant, from Corinth, 1 November, began his first move against Vicksburg, by ordering his troops forward to Grand Junction, purposing to move along the railroad by way of Holly Springs and Grenada to the rear of the city, while Sherman should co-operate from Memphis. A raid by Forrest destroyed long reaches of railroad above Jackson, and the destruction of the depot of supplies with its immense stores at Holly Springs, 20 December, by Van Dorn, effectually paralyzed Grant's advance toward Vicksburg.

During Forrest's and Van Dorn's operations east of the Mississippi Gen. T. C. Hindman, in Arkansas, attacked Gens. F. J. Herron and J. G. Blunt at Prairie Grove, but retreated after a severe engagement. On 16 December Gen. N. P. Banks relieved Gen. Butler at New Orleans.

Sherman was then sent, 20 December, from Memphis down the Mississippi to ascend the Yazoo and attempt the capture of the left flank of the defenses of the city at Haines' Bluff. He assaulted at Chickasaw Bayou, 29 December, with disastrous results, and returned to the mouth of the Yazoo, where he was met by Gen. J. A. McClernand with orders to assume general command. This officer at once moved up the Arkansas River with Porter's gunboat fleet and Sherman's and G. W. Morgan's corps, captured Fort Hindman 11 January, and returned to Young's Point. From this position the Vicksburg campaign of 1863 began, which opened the Union operations of that year.

The first attempt was to cut a canal across the peninsula opposite Vicksburg, which would allow the army to move below Vicksburg. After working on this from 22 January to 7 March, a flood destroyed it. Efforts were next made to open a way through Lake Providence to the Red River, making a circuit of 350 miles to a point below the city. Both this plan and one for the east side through the Yazoo pass leading to the rear of the city, being actively opposed by the Confederates, and found otherwise exceedingly difficult, were abandoned.

A way was finally found from Milliken's Bend by way of New Carthage to a point on the river opposite Bruinsburg. On the night of 16 April the memorable running of the Vicksburg batteries by the fleet of Admiral Porter, convoying transports, was successfully accomplished. The means of ferrying his forces over the Mississippi being thus secured, the advance of the army crossed 30 April. Port Gibson was captured 1 May, after a stubborn and most gallant defense against a greatly superior force by Gens. Bowen, Baldwin, and Cockrell. Grant was then on solid ground in rear of Vicksburg.

He moved at once to intervene between Pemberton at Vicksburg and Johnston, who was seeking a junction with Pemberton. Johnston was forced out of Jackson by Sherman's and Gen. James B. McPherson's troops 14 May. Grant then turned toward Pemberton, advancing from Vicksburg, defeated him at Champion's Hill on the 16th, again at Big Black Bridge on the 18th, whence Pemberton withdrew into Vicksburg, followed by Grant. On the 19th Grant ordered an assault, which was repulsed, and again on the 22d, with the same result. A regular siege was then undertaken, and Pemberton's army was starved out and surrendered 4 July.

On 24 May 1863, Gen. J. M. Schofield, who had been active and prominent in Missouri from the first, relieved Gen. Curtis in command of the Department of the Missouri. During the Vicksburg campaign he sent all troops that could be spared to Grant. Upon their return he was able to advance Gen. Steele to the line of the Arkansas and hold it thereafter. During 8–14 June Grant received a division from Gen. S. A. Hurlbut's command, under Gen. Sooy

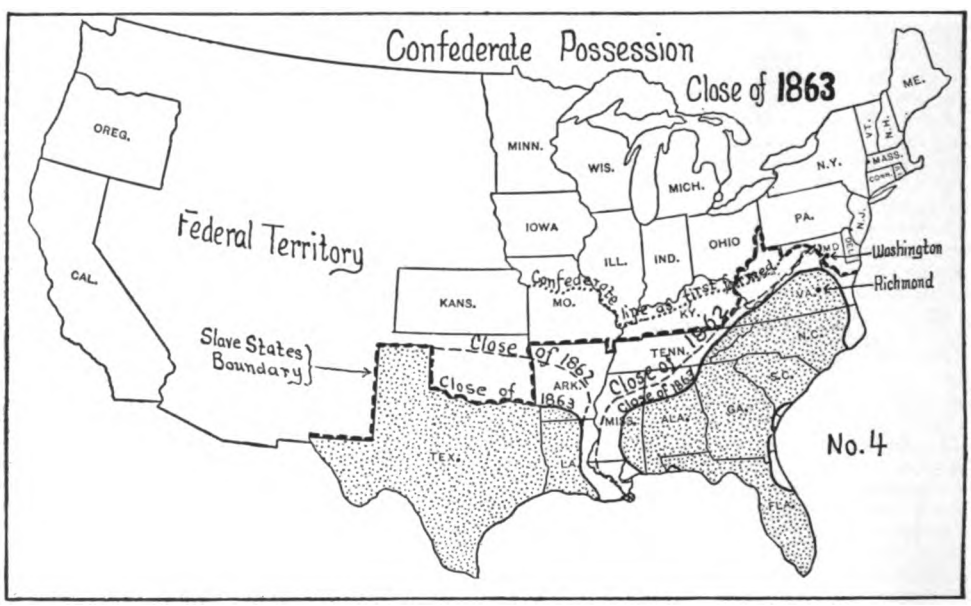
Smith, one from the Department of the Missouri, under Gen. Herron, and two divisions of the Ninth corps under Gen. J. G. Parke. During the operations of Gen. Grant about Vicksburg Gen. Banks was active in Louisiana. After three unsuccessful attempts against Port Hudson, which he twice assaulted, it finally surrendered, 8 July, upon hearing of the capture of Vicksburg.

In January, February, and March 1863, the Union ironclads under Admiral Dupont made unsuccessful attacks upon Fort McAllister in the Ogeechee River, but in one of them destroyed the noted blockade-runner Nashville. The Confederates were active on the North Carolina coast early in 1863, Gen. Hoke capturing Plymouth 20 April.

The campaign of the year in the Army of the Potomac was opened by Hooker. On 28 April Gen. John Sedgwick's corps was thrown across the Rappahannock at Fredericksburg, the rest of his army crossing above at Kelly's ford, and thence advancing across the Rapidan at Germanna and Ely's fords, to and beyond Chancellorsville. His force was fully twice that of Lee. On 1 May Hooker's advance fell back to Chancellorsville. On 2 May "Stonewall" Jackson's corps of three divisions was descried at different times during the day from several points of the Union line moving toward its right. No preparations were made to guard against a flank attack, though orders to that effect were early given. At 6 P.M., while the troops of the Eleventh corps holding the right were at supper, Jackson's solid columns burst upon them and disastrously routed the Union right. On the 3d Sedgwick's corps advanced from Fredericksburg to Salem Church, was defeated that afternoon, and recrossed the river on the night of the 4th. The night of the 2d Jackson, reconnoitering in front of his pickets, was mistakenly fired on by them and mortally wounded. On the 3d, by hot fighting, Hooker's lines were forced further to the rear. The 4th passed without an engagement, as Lee, with the greater part of his army, was at Salem Church. The night of the 5th Hooker, thoroughly defeated, recrossed the river, and his army was reassembled at Falmouth.

On 3 June Lee, from Fredericksburg, began his second invasion of the North, Longstreet's troops leading. After minor engagements in the Valley, Gen. R. S. Ewell's advance crossed the Potomac at Williamsport 15–16 June, moved forward to Chambersburg, and had reached the vicinity of Harrisburg and Columbia on the Susquehanna, and captured York 28 June, when recalled to Gettysburg, where Lee's army was concentrating.

Meantime, the Army of the Potomac under Hooker reached the vicinity of Frederick, when Hooker, not being allowed to order the garrison of Harper's Ferry, over 10,000 strong, to join him, asked to be relieved, and Gen. George G. Meade succeeded him. The two armies met



forced out of his lines and retreated over the Cumberlands and across the Tennessee to Chattanooga. It was chiefly a strategic campaign, carried on in continuous rains of most unusual severity, occupying nine days, and involving a total loss of only 560 killed, wounded and missing. The Union line advanced to the western base of the Cumberland Mountains.

The succeeding campaign, having Chattanooga for its objective, required extensive repairs to the railroad and an accumulation of supplies sufficient for leaving a base for a month, and moving in a mountainous region largely barren. The movement began 16 August. Bragg was at Chattanooga. Rosecrans' army lay along the western base of the Cumberlands from Winchester to McMinnville. Rosecrans feinted with his left corps, Gen. T. L. Crittenden's, by throwing it from McMinnville over the mountains, its advance being into the valley of the Tennessee above Chattanooga. This led to the belief that a junction was to be formed with Burnside from Knoxville, or an attack made upon the city from that quarter. Bragg, as a result, fixed his attention upon this move. Meantime the centre corps, Thomas', and the right, Gen. A. McD. McCook's, crossed the Cumberlands and the Tennessee River some 30 miles below Chattanooga, continued over the Sand Mountains, and ascended the Lookout range — all bold mountains with palisaded summits crossed only by very difficult and widely separated mountain trails. When Rosecrans' columns were ascertained to be on Lookout, Bragg, 7 and 8 September, withdrew from Chattanooga, the heads of the Union columns having in the meantime descended into McLemore's Cove, south of Chattanooga. Upon Bragg's reaching Lafayette, 26 miles south of Chattanooga, he awaited Longstreet's arrival from Virginia, meantime unsuccessfully demonstrating against Rosecrans' centre and left east of Lookout in the valley of the Chickamauga. Crittenden's corps, after having accomplished its diversion, had crossed the Tennessee, left one brigade in Chattanooga, 9 September, and moved south through Rossville to a position on Rosecrans' left at Lee and Gordon's Mill on the Chickamauga. Bragg, strengthened by Longstreet, started back 17 September toward Chattanooga, seeking to interpose between Rosecrans and that city. Rosecrans, by a night march, 18 September, proceeded toward Chattanooga, formed his lines between Bragg and the city, nine miles south of it, at Chickamauga. A two days' battle, 19 and 20 September, ensued for the possession of the roads to Chattanooga. At noon of the second day Longstreet broke through a gap at the centre of the Union lines, cut off two divisions of the right wing, and forced them with fragments of other divisions from the field, Rosecrans, McCook, and Crittenden being caught in the break. Gen. Thomas, with the greater part of seven divisions, held the field, and at night withdrew to Rossville and there reformed the army between Bragg and the city, thus securing its possession without further fighting. Bragg advanced on the 22d, and formed his lines in front of the city, which Rosecrans soon rendered impregnable by heavy earthworks. Bragg's lines embraced Lookout Mountain and Missionary Ridge, heights overlooking the city, the mountain position closing the river line of supplies. The situation of the Union army soon became precarious for want of food and forage. Hooker, with the Eleventh and Twelfth corps was ordered from the Army of the Potomac, reaching Bridgeport 30 September; and Sherman, with four divisions from the vicinity of Vicksburg. Grant was assigned to general command, arriving 23 October. Rosecrans was replaced by Gen. George H. Thomas 19 October. The river line of supplies was opened 28 October upon a plan devised by Gen. Rosecrans and executed by Gen. W. F. Smith, Hooker being brought forward to Lookout Valley, and troops from Chattanooga forming a junction with him. The battle of Chattanooga occupied three days. On 23 November Thomas, in the centre, threw forward one division, supported by four, and captured the advanced line of Bragg. The night of the 23d Sherman crossed the river six miles above the city and seized an unoccupied range overlooking the north end of Missionary Ridge. On 24 November Hooker carried the western and northern slopes of Lookout Mountain, and the next day moved against the south end of Missionary Ridge. The afternoon of 25 November Thomas, at the centre, assaulted Missionary Ridge, his storming line being two and a half miles front, carried the earthworks at the foot of the ridge, and next the ridge itself, capturing 37 guns on the summit, and forcing a general retreat. From this time Chattanooga remained in Union control to the close of the war. (See CHATTANOOGA, BATTLE OF; CHICKAMAUGA, BATTLE OF.)

The same day that Rosecrans started from Winchester, Tenn., for Chattanooga, Burnside with the Army of the Ohio (Twenty-third corps) left Lexington, Ky., for Knoxville, Tenn., his Ninth corps being still with Grant near Vicksburg. He reached Knoxville 2 September. Being ordered to assist Rosecrans at Chattanooga, he was held by demonstrations of a small force from making the junction. On 4 November Bragg despatched Longstreet's corps from Chattanooga to besiege Knoxville. On the 29th he assaulted Fort Saunders and was repulsed with serious loss. Sherman, who was sent by Grant from Chattanooga after the success there, now approaching, Longstreet retreated to Virginia. On 16 December Burnside was relieved and ordered to recruit the Ninth corps, which was assembled at Annapolis.

Throughout these operations both Union and Confederate forces in Charleston harbor had been engaged in formidable attack and most stubborn and brillant defense. Gen. Gillmore, who had reached Charleston 12 June, immediately undertook engineering and siege work of unprecedented character as to success at long ranges; and finally, after several severe repulses, forced the evacuation of Fort Wagner 7 September, and soon shells reached the city from his long-range guns. While some of these fell in Charleston 31 August, the regular bombardment began 16 November.

On 28 Jan. 1864, Gen. Rosecrans was ordered to relieve Gen. John M. Schofield in Missouri, the latter being assigned a little later to the command of the Department and Army of the Ohio at Knoxville. Gen. Rosecrans repulsed the invasion of Gen. Price, and then sent troops not needed to Gen. Thomas at Nashville. On 20 February an expedition sent from Charleston to Florida by Gen. Gillmore under

Gen. Seymour, was disastrously defeated by Gen. Finegan at Olustee. From February to December 1864, Gen. Forrest was active throughout west Tennessee and northern Mississippi and Alabama, performing much brilliant cavalry service, to the continued disturbance of all Union commands in those regions.

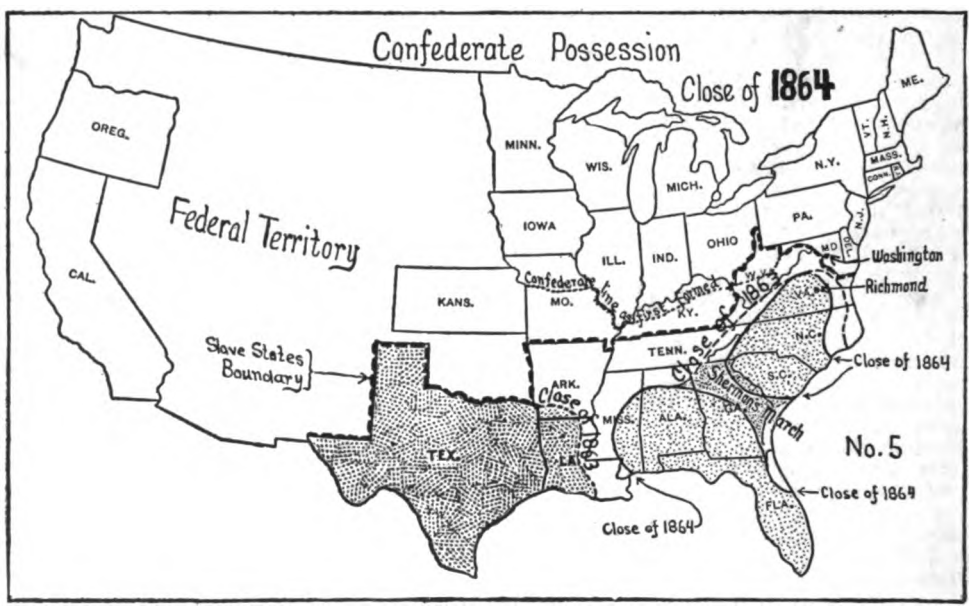
Early in the spring of 1864 Banks, supported by Admiral Porter's fleet, was ordered to advance up the Red River. At Sabine Crossroads 8 April, he was defeated and driven back to Pleasant Grove, and thence to Pleasant Hill 13 April, where A. J. Smith, from Sherman's army, re-enforced him. The fleet narrowly escaped capture by the falling of the river, and altogether the campaign was a decided failure. The defeat of Banks enabled the Confederate general, J. F. Fagan, to force Gen. Frederick Steele, who was advancing to co-operate with Banks, back to Little Rock. Banks was relieved 12 May by Gen. E. R. S. Canby.

On 12 March 1864, Gen. Grant, who had been commissioned lieutenant-general, that grade having been revived by Congress, was placed in command of all the armies. Early in April he had formed a plan for a combined movement of the armies to begin toward the last of the month, and had communicated the same to Meade with the Army of the Potomac, Butler at Fort Monroe, Sherman at Chattanooga, and Banks at New Orleans. The main Confederate armies were those of Lee, at Orange, with Longstreet at Gordonsville, confronting Meade in the vicinity of Culpeper, and Johnston at Dalton, Ga., facing Sherman in the vicinity of Chattanooga.

Grant's general plan was for Gillmore, from South Carolina, with 10,000 men, to join Butler at Fort Monroe, giving him 23,000 troops for a move up the James to capture City Point, threatening Petersburg and the rear of Richmond. Burnside, with 25,000 men assembling at Annapolis, was to join Meade, and the Army of the Potomac was to advance toward Richmond by Lee's right. Sherman, with three armies, the Cumberland, under George H. Thomas, the Tennessee, under McPherson, and the Ohio, under Schofield, aggregating nearly 100,000 men, was to move against Johnston's army at Dalton and follow it. Banks was to leave the Red River country to Steele and the navy, abandon Texas, and move against Mobile with his 25,000 men, re-enforced by 5,000 from Missouri.

Grant established his headquarters with the Army of the Potomac, Meade having the full direction of the army under Grant's general orders. The Army of the Potomac moved toward the Rapidan in the early morning of 4 May, and by night all the troops had crossed.

Grant's force was about 119,000, and Lee's about 62,000. Lee pushed rapidly to his right and struck Grant's advance in the Wilderness 5 May. Terrific fighting followed till the night of the 6th. Lee pushed on to Spottsylvania, reaching it in advance of Grant and interposing on the



line to Richmond. Both armies entrenched, and from the 8th there was bitter fighting until the night of the 20th, when Grant started for North Anna. From Spottsylvania 8 May, Sheridan, commanding Grant's cavalry, made a raid around Lee's army, encountering and defeating J. E. B. Stuart at Yellow Tavern 11 May, where Stuart was killed. Sheridan spent a day within the outer defenses of Richmond, and joined Butler on the James. Grant proceeded to move to his left, everywhere opposed by Lee, fighting heavily at North Anna and Bethesda Church, reaching Cold Harbor 2 June. On the 3d Grant assaulted along his whole line, to meet in an hour with terrible slaughter and repulse, so serious that an order for a second assault was not carried out. Grant had failed to interpose between Lee and Richmond. From Cold Harbor he sent Sheridan with his cavalry to occupy the attention of Fitzhugh Lee's and Hampton's cavalry while he withdrew to the James. Sheridan defeated both at Trevilian's Station. Grant

then moved without interruption to the James, reaching it 13 June, and crossing it in the vicinity of City Point and Bermuda Hundred. Gen. Butler had occupied these points 5 May. On the 14th Butler carried the outer defenses of Drewry's Bluff, but was thence driven back by Beauregard's troops, who had arrived from the south, and his contemplated movement toward Petersburg and the rear of Richmond was defeated. Lee occupied the Petersburg lines. Grant attacked the works several times unsuccessfully from 15 to 18 June. On 30 July an attempt on the works was made by exploding a mine. The explosion was a great success, but the assault to follow it was a failure. This was the battle of The Crater.

From the establishment of Grant's lines before Petersburg frequent and heavy fighting continued until about 1 November, but with little permanent impression on Gen. Lee's lines. The Union left, however, was extended across the Weldon R.R. On 28 September Gen. Butler, with two corps, crossed to the north side of the James and captured Fort Harrison, a position from which Richmond was seriously threatened. On 16 November Butler, supported by Porter's fleet, was sent to capture Fort Fisher, but failed. During the winter the lines of each army were greatly strengthened. On 7 December Grant had extended his left 20 miles to Hicksford on the Weldon R.R. On 22 June Gen. James H. Wilson, with two divisions of cavalry, moved against the railroads south of Richmond, destroying nearly 50 miles of track, and inflicting much other serious damage. His return route was blocked, but he brought his forces in with some loss of both artillery and trains. He had severed all railroad connections with Richmond, and they were not fully restored for several weeks. Gen. Franz Sigel's campaign began 1 May. On the 15th he moved up the Shenandoah to New Market, and was defeated, cadets from the Virginia Military Institute taking prominent part. At Grant's request Sigel was suspended and Gen. David Hunter assigned. The latter pushed on to Lynchburg, but was compelled by Gen. Jubal A. Early to retreat from that point by way of the Kanawha and Ohio rivers to Parkersburg, and thence by rail to the east. Gen. George Crook's wing of Sigel's column from the Kanawha penetrated to the Tennessee and Virginia R.R. at Wytheville.

On 6 May Gen. Sherman moved from the vicinity of Chattanooga against Gen. Johnston at Dalton. The Union army had in round numbers 100,000, the Confederates being about half as strong. After vainly attacking the gaps and ranges in front of Dalton for several days, Sherman passed his army through Snake Creek Gap leading to the rear of Dalton. This compelled Gen. Johnston to retire from his camps, and he was defeated at Resaca. Johnston resisted stubbornly at every step, but he was successively flanked out of every new position until he reached Atlanta. Fighting had been in progress at some points of the line from May till September. Johnston was succeeded by Hood 18 July, and on the 20th Hood attacked at Peach Tree Creek, and was repulsed with great loss. He then moved out of Atlanta and attacked, and was again defeated. Gen. McPherson, commanding the Army of the Tennessee, was killed. The next attack was at Ezra Church 28 July, upon the Army of the Tennessee, this also being repulsed after three hours' severe fighting, with much loss.

On 2 September Sherman occupied Atlanta, which was evacuated as a result of his moving to the rear of the city on Jonesborough. Hood first raided Sherman's railroad communications, fighting heavily at Allatoona 5 October, and soon after moved northward. Gen. Thomas was sent to resist his movement if he invaded Tennessee, and Sherman started 15 November on his March to the Sea. While it was originally intended by Gen. Grant that he should move from Atlanta to Mobile, the harbor there having been captured 5–23 August by Farragut and Canby, he decided upon the alternative which Grant had suggested before the campaign opened, and started for Savannah.

The fight of Farragut's fleet in the harbor of Mobile, which decided Sherman's march to Savannah, was one of the most brilliant in naval warfare. The Confederate fleet was destroyed, including the far-famed ironclad ram Tennessee. Sherman reached Savannah with slight opposition. On 17 December he summoned Hardee to surrender. The latter refused, and on the night of the 20th retired with his force of 10,000 without molestation. The next morning the Union army entered.

Meantime Hood had invaded Tennessee with the entire army with which Sherman's three armies had been confronted from May till September. Gen. Thomas left with two small but excellent corps, by great exertion organized an army to oppose Hood. On 30 November Gen. Schofield, commanding in the field in front of Hood, inflicted a nearly fatal blow upon him at Franklin. After Gen. Thomas' forces were united at Nashville 15–16 December, he attacked Hood's entrenchments in front of the city and dispersed and practically annihilated his army.

The forced retreat of Hunter from Lynchburg over the mountains of West Virginia left the Shenandoah unprotected. Gen. Early entered it, drove Sigel across the Potomac, then on 9 July defeated Wallace, who was in small force at Monocacy, Md., threatened Baltimore and appeared before Washington 11 July. Here he was met by veterans of the Sixth and Nineteenth corps, Army of the Potomac, hurried to Washington by Grant, and forced into rapid retreat. Upon the withdrawal of the troops from the Army of the Potomac Early again sent a force under Gen. John McCausland, into Pennsylvania, and these invaders burned Chambersburg 30 July. Sheridan, being assigned to command, forced Early beyond Staunton; and devastating the Valley, he withdrew to Cedar Creek. While Sheridan was absent Early attacked and drove the army out of its camps. Gen. H. G. Wright, however, rallied the troops near Middletown and restored the battle. Sheridan arriving, the army advanced, and Early was so seriously defeated as to close the campaign in the Valley.

The first movement of the final campaigns of 1865 began 2 January in Tennessee, when Gen. Schofield with the Twenty-third corps left Columbia, Tenn., for Clifton on the river bound for the east. The corps left Alexandria on transports soon after 1 February, and landed at the mouth of Cape Fear River 9 February,

where the Tenth corps was established, which, under Gen. Alfred H. Terry, had captured Fort Fisher, that had been most stubbornly and gallantly defended against the army and the fleet by Gen. W. H. C. Whiting. Fort Anderson was attacked by army and fleet, and abandoned 19 February; the position of Town Creek was carried 20 February, and Wilmington was taken 22 February. Operating next by way of Newbern, Gen. R. F. Hoke was defeated at Kingston 10 March. Goldsboro was occupied by Gen. Schofield on the 21st. Sherman's army joined Schofield here on the 23d. On 26 January Gen. Terry had been despatched to co-operate with Admiral Porter in reducing Fort Fisher at the mouth of Cape Fear River. A previous expedition under Gen. Butler, 13–16 December, had failed, but the fleet had remained, and Porter had appealed to Grant to send another force. Terry's troops effected a landing above the fort 13 January. The next morning he was entrenched across the peninsula. Early on the 15th the fleet opened a terrific bombardment, which was continued until a force of marines was landed in the afternoon to co-operate in the assault of the army. This was delivered at 3.30 in the afternoon, the flank of the work next the river being carried. Then followed severe fighting for each succeeding traverse. It was not until 10 o'clock at night that the fort was finally carried. Sherman started northward from Savannah 1 February. Marching through swamps, and crossing all streams at flood, he was before Columbia on the 16th. It was surrendered without fighting the next day. Charleston, being cut off from interior communications, was evacuated by Gen. W. J. Hardee 18 February. Fayetteville, N. C., was reached 11 March. The first opposition stronger than skirmishing was at Averasboro 16 March, where Gen. Hardee made a brief stand. On 19 March Johnston's army, which had been collected on Sherman's front at Bentonville, checked his advance and nearly overwhelmed his left wing before the right wing, which was widely separated from the left, could reach it. On the 21st Johnston was defeated after sharp fighting, and Sherman marched for Goldsboro, which he reached 23 March.

On 2 March Sheridan advanced up the Valley, defeated Early at Waynesboro, and proceeded through Charlottesville and along the Richmond & L. R.R., destroying roads and stores, and joined Grant at Petersburg. Gen. James H. Wilson, operating under Gen. George H. Thomas, crossed the Tennessee 22 March with a thoroughly equipped mounted force of 12,500, and 1,500 dismounted to follow until horses could be captured. His first objective was Selma, Ala. A portion of Forrest's cavalry was encountered and defeated at Montevallo 30 March. The fortifications of Selma were carried against Forrest 2 April, and immense war supplies and plants for the manufacture of war materials destroyed. Montgomery surrendered 12 April; West Point was captured 15 April,

after sharp fighting; Columbus was carried by a night assault 16 April; Macon surrendered 20 April. Here Wilson received notice of the Sherman–Johnston truce. An expedition, sent out 7 May by Wilson from Macon, under Col. Pritchard, Fourth Michigan, captured Jefferson Davis, 10 May, at Irwinsville, Ga. On 6 February the Confederates made a heavy attack at Hatcher's Run on Grant's left, but were finally repulsed with a Union loss of about 1,500. The night of 24 March Gen. J. B. Gordon made a daring and most successful assault upon the right of Grant's lines at Petersburg, capturing Fort Stedman and three strong works. These were recaptured the next day.

The Army of the Potomac was the last to move in the opening campaigns of 1865. It had occupied its lines before Petersburg without general movement from November till the last of March. The general movement, which was to the left, began on the 29th, and brought on

the battle of Dinwiddie Court House and White Oak Road on the 31st, and the battle of Five Forks on April 1st, in which latter engagement the Confederates were defeated. On 2 April the Confederate entrenchments were carried, and Gen. Lee abandoned his lines during the night, having notified President Davis during the forenoon that he would begin a retreat on Amelia Court House that night. Jefferson Davis received this dispatch in church. He and his Cabinet immediately collected personal effects and Confederate archives, and left Richmond on a special train. Gen. Godfrey Weitzel received the surrender of the city on 3 April.

Gen. Lee's army was assembled at Amelia Court House 5 April, and continued its retreat at night. On the 6th Gen. Meade advanced on Amelia Court House, but, finding that Gen. Lee had left, he moved toward Deatonsville (Sailor's Creek), where the most of Ewell's corps, the rear of Lee's army, was captured 6 April. About the same time some 10,000 men of the divisions of Anderson, Pickett, and Bushrod Johnson, were captured. Lee continued his retreat and reached Farmville on the morning of the 7th. Here his troops received their first rations since the retreat began. At 11 o'clock, Union troops appearing, the march was renewed, his men being greatly exhausted with loss of sleep, hunger, and hard marching. On this day the correspondence began between Gens. Grant and Lee, which, on the 9th, resulted in the surrender of Lee's remaining forces at Appomattox. The number paroled was 28,231 officers and men, extra duty men, and detailed men of every description, this remnant being all that was left within the control of Gen. Lee of his magnificent fighting machine, the Army of Northern Virginia.

In North Carolina Sherman and Schofield moved against Johnston, occupying Raleigh 13 April. On the 14th Johnston asked for a conference, and on the 18th terms of surrender were agreed upon, subject to the approval of the President of the United States. These, being deemed in part political, were disapproved, and Gen. Grant was sent to Raleigh to insist upon the same terms made with Lee. These Gen. Sherman demanded of and received from Gen. Johnston 26 April, and the War was over, though small independent forces were in the field for a short time thereafter, Gen. Dick Taylor, in Alabama, not surrendering to Gen. Canby till 4 May.

President Lincoln made nine calls for troops during the War. Under these about 2,800,000 men of all classes were enlisted, including emergency men of a few weeks, three, six, and nine months' men, two and three years' men, conscripts and substitutes. There were 52,000 drafted men held to service; 75,000 conscripts who sent substitutes; and 42,000 men who sent substitutes, although not themselves drafted.

The Confederate records are very deficient, having been largely destroyed. The best estimate from the data in the possession of the war department places the Confederate strength at something over 1,000,000. After Mr. Davis' calls of the first year a general conscription act was passed 16 April 1862, including all white men between the ages of 18 and 35 for the term of 3 years. On 27 Sept. 1862, this act was extended to include those of 45 years. On 17 Feb. 1864, the law was extended to those between 17 and 50, the term to be for the war.

According to the latest compilation of the record and pension office of the War Department, the total number of deaths from all causes in the Union army during the War was 359,528. As many records are incomplete, the actual number must be somewhat larger. On the basis of the figures given, there were killed in action, 67,058; died of wounds received in action, 43,012; died of disease, 224,586. The Confederate losses were quite as severe in proportion to strength, but the records are wanting to such an extent as to make definite estimates of little value.

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Bibliography.— 'War of the Rebellion Records,' Vols. I. to CXXXVI.; Compte de Paris, 'History of the Civil War in America'; Rossiter Johnson, 'History of the War of Secession'; J. C. Ropes, 'Story of the Civil War'; Scribner, 'Campaigns of the Civil War'; the Century Company's 'Battles and Leaders of the Civil War'; T. A. Dodge, 'Birds'-eye View of Our Civil War'; Greeley, 'The American Conflict'; Draper, 'History of the American Civil War'; Fiske, 'The Mississippi Valley in the Civil War'; Bigelow, 'France and the Confederate Navy'; Grant, 'Memoirs'; Sherman, 'Memoirs'; Jefferson Davis, 'Rise and Fall of the Confederate Government'; Pollard, 'The Lost Cause'; Moore, 'Rebellion Record'; Bulloch, 'Secret Service of the Confederate States'; Giddings, 'History of the Rebellion'; McPherson, 'Political History of the Great Rebellion'; Rhodes, 'History of the United States from the Compromise of 1850'; Schouler, 'History of the United States Under the Constitution'; Burgess, 'The Civil War and the Constitution'; and Blaine, 'Twenty Years in Congress,' the first volume.

Civil Wars of Rome, The, in their widest extent began with Tiberius Gracchus, and terminated with the election of Octavius Augustus to the empire, 133–131 B.C. In a more limited sense they mean the contest between Caius Marius and Cornelius Sylla, or Sulla (88–78 B.C.). The original cause of the civil war was the struggle between the oligarchy and the democracy of Rome. This struggle lasted till Sylla restored the senate to sovereignty; but this sovereignty was soon disturbed by Julius Cæsar (q.v.).

Civilian, in common speech a word denoting a person whose employments are wholly of a civil character as distinguished from one who belongs to the army or navy, while in legal acceptation it designates one who is learned in civil or Roman law.

Civi'lis, Germanic leader of the Batavi in their revolt against the Romans, 69–70 A.D. At one time he held a command in the Roman army, but being more than once charged with treason he escaped and roused the Batavians, his countrymen, to rebellion. Pretending to espouse the cause of Vespasian against Vitellius, he raised a powerful army, and inflicted severe defeats on the Romans. An imposing force sent against him he routed and shut up in the military station, Vetera Castra, which after a long siege capitulated, on which all its defenders were slaughtered. Fortune at last for-

sook him, and he had to negotiate with the Romans, the Batavians returning to their allegiance. His fate is unknown.

Civiliza'tion (from the Latin *civilis*, "like a citizen" (*civis*), that is, having the virtues or qualities of a citizen), a term that may mean many things, but is commonly applied to the upward movements of peoples toward higher intellectual, moral, social, and industrial altitudes. "Whatever," says John Stuart Mill, "be the characteristics of savage life, the contrary of these, or the qualities which society puts on as it throws off these, constitutes civilization." The word means, therefore, social progress, the improvement or perfecting of the laws, both written and unwritten, which make for security and peace, and the harmonious development of individual life. The word is often used relatively, meaning the dominant influences of the present period, as when we speak of "our civilization." The most eminent writers who have dealt with this subject have chosen to treat it in different ways. Guizot in his history writes of political or institutional progress, and thus his definition of civilization differs from that of Buckle, who, minimizing institutions as resultant forces, treats the individual as paramount. Many are the influences that determine the character of civilization. Among these Buckle places climate, soil, food, and what he terms the "General Aspect of Nature." To these influences he attaches, perhaps, undue importance, inclining to the minimizing of those innate or inherited qualities in the different races of mankind. His history is written from the view-point of a necessitarian. His theory that moral truths are stationary, intellectual truths alone progressive, and that religion has done more harm by its persecutions than good by its moral and spiritual ministrations, must be taken as showing the bias of an otherwise valuable work, the chief merit of which is its assertion of the claims of the individual against interference in the name of authority. Not all writers hold to the view that our present civilization is a development from primitive rude conditions, but, on the contrary, contend that it was the original state of mankind from which the savage races have in reality descended, and that our present civilization is therefore an artificial approximation to conditions prevailing before the descent. But the other view — namely, that civilization is a development out of barbarous beginnings — is the one commonly held.

A kind of civilization may exist based upon laws and customs which constitute a survival of barbarism, and which are working for the overthrow of institutional civilization which other forces are laboriously building up. Thus ancient civilizations, the democracies of Sparta and Athens, were based upon slavery — the civilization of much of Europe, upon a burdensome militarism that saps its strength. It is hard to say what constitutes a true civilization judged by its fruits, but it may be said to be based primarily upon respect for human rights. Wherever a society exists in which classes are deprived of the fullest participation in its opportunities, there, it may be said, true civilization cannot flourish, however brilliant may seem its achievements, however pleasing its outward countenance, however gracious its aristocracy. Civilization is progress (Guizot's definition) only as society moves forward as a whole. Nor is it in its arms and powers of conquest, but in its domestic virtues that its greatness consists. Augustus did more to make lasting the greatness of imperial Rome when he strove to promote her domestic life and her civic virtues than did the long line of emperors who sought the destruction of her rival cities. Civilization is not a chain in which every link is apparent, though doubtless such links there are. With the age of Charlemagne, the old civilization receded, and the new was born. But this was so only in appearance, since the race is forever in process of development; it is at no one minute what it was the minute before. Every period marks as stupendous if invisible a change from the old to the new. The ancient bonds are not broken; they loosen and fall off. The spectacle of nations rising to greatness from small beginnings, and then slowly sinking, the prey to conquerors from without and internal forces from within, has constituted the perpetual enigma to those who have written histories of civilizations. Yet some later science of history will make the secrets of their decay and death as obvious as the methods by which in their beginnings they rose to greatness and power. The reasons will be found in the denial of natural justice and natural equality among men. From the past it may be predicted with tolerable safety that there will be progress on the whole; that the progress will be intermitted and interrupted; and that it will never, perhaps at the best, be quite as satisfactory as it might be.

Bibliography.— Buckle, 'History of Civilization'; Guizot, 'History of Civilization'; Mackinnon, 'History of Civilization'; Kidd, 'Principles of Western Civilization'; Draper, 'Intellectual Development of Europe'; Maine, 'Village Communities in the East and West'; Tylor, 'Researches into the Early History of Mankind'; Tylor, 'Primitive Culture'; Wachsmuth, 'Allegemeine Kulburgeschichte.'

Civiliza'tion, An Introduction to the History of, a noted work by Henry Thomas Buckle, published 1857–61. Although the progress of science has uncovered facts that prove the weakness of an occasional principle in the 'History of Civilization,' the work remains one of the greatest popular contributions of modern times to the new aspect of history, as a human document, to be read by the light of scientific discovery. No book of its time was more influential in turning the direction of men's thoughts to the phenomena of social and political science.

Civilization in Europe, a history, by François Guizot. In this work Guizot begins with the fall of the Roman empire, and ends with the opening of the French Revolution. Although he analyzes all the important facts of history between the great landmark of 476 and the convocation of the States-General in 1789, he is far more anxious to grasp their import than to give a vivid relation of them; and therefore, facts in themselves play but a small part in his exposition. They are simply a help in his effort to discover the great laws that direct the evolution of humanity, and to show its development in the individual and in society. His investigations are limited to purely social development, and he does not touch upon the intellectual side of the question.

Civita-di-Penne, chē-vē'tä dē pĕn'nä, Italy (the ancient PINNA-VESTINA), a small town in the province of Teramo, Naples, built on two hills, 29 miles east by north of Aquila. It was formerly a place of importance. The Normans, under Roger I., made it the capital of their kingdom.

Civita-Vecchia, chē'vẹ-tä vĕk'kē-ä. See CITTA VICCHIA.

Civitali, Matteo, mät-tā'ō chē-vē-tä'lē, Italian sculptor and architect: b. Lucca 1435; d. 1501. He followed the occupation of a barber until about 1470, when he suddenly rose to the highest rank among the sculptors of his time. His first important work was the mausoleum erected in the cathedral at Lucca to Pietro de Noceto, secretary to Pope Nicholas V. His greatest works are six statues of white marble in the same church, representing personages of the Old Testament. Among his architectural works is the Bernardini palace at Lucca, of simple style, and also the little temple which contains the miraculous crucifix in the church of St. Martino. The Uffizi Gallery at Florence contains Civitali's statue of 'Faith.'

Civoli, chē'vō lē, **Ludovico.** See CIGOLI LUDOVICO CARDIDA.

Clackmannanshire, klăk-măn'ạn shēr, Scotland, the smallest county, being only about nine miles long, seven wide, and comprising an area of about 35,160 acres or 55 square miles. By the recent readjustment of county and parish boundaries the parish of Alva, formerly a detached portion of Stirlingshire, was added to the county, increasing its area by over 5,000 acres. It lies on the north side of the Forth, by which it is bounded southwest. On all the other sides it is enclosed by the counties of Perth, Fife, and Stirling. The north part of the county is occupied by the Ochil Hills, but the other portions are comparatively level, and in general are exceedingly fertile, yielding large crops of oats, barley, wheat, and beans, turnips, and other green crops. The minerals are valuable, especially coal, which abounds. There are ironworks, breweries, and distilleries, woolen manufactures, tanning, glass-works, etc. The principal towns are Alloa (the largest), Alva, Tillicoultry, Dollar, and Clackmannan; the last is nominally the county town. It is rather poorly built, but has an interesting old tower and an old market-cross. Pop. (1901) 32,019.

Clacton-on-Sea, England, a popular watering-place on the coast of Essex, 15 miles southeast of Colchester, with admirable facilities for sea-bathing, and of easy access from London both by railway and steamboat. It stands on cliffs over 40 feet high, and has a town-hall, a church in the early English style; a long ocean pier, etc. Pop. (1901) 7,453.

Cladel, Léon, lā-ôn klä-dĕl, French romancist: b. Montauban 1855; d. 1902. He rose suddenly into prominence with his story, 'The Ridiculous Martyrs' (1862), a satirical description of the lower walks of literature in Paris. This first success was repeated with the later novels: 'Eral the Tamer'; 'One Qouael'; the 'My Peasants' series; 'Barefoot'; 'A Woman Under Ban,' for which he suffered four weeks' imprisonment; and many others.

Cladium, klā'dĭ-ŭm, a genus of plants of the sedge family (*Cyperaceæ*), with about 30 species natives of tropical or temperate climes. There are only three species found in America, of which the most common is the twig-rush (*C. mariscoides*), found in marshes from Minnesota eastward to Nova Scotia, and southward to Florida. This plant is very common in certain of the fenny districts of England, where it is used for thatching.

Cladocera, klạ-dŏs'ẹ-rạ, a group of *Crustacea* forming a sub-order of the order *Branchiopoda,* and by some authors regarded as an independent order. It is represented by the little water-flea, *Daphnia,* in which the body, consisting of few segments, is protected by a bivalvular shell, though the head, with its antennæ, is uncovered. The legs are short and leaf-like. It lays summer and winter eggs, the latter enveloped in a peculiar shell, the "ephippium," and the young develop in a space between the shell and the back of the animal, which forms a brood-pouch.

Cladrastis, klă-drăs'tĭs, a genus of the pea family, with two species, one in Manchuria, the other (*C. lutea*) in eastern United States. The American or Kentucky yellow-wood is a species with smooth bark, and sometimes grows above 50 feet in the rich soils of Kentucky and Tennessee. The wood, which weighs about 40 pounds to the cubic foot, is strong and hard, and of a bright yellow color. It produces a dye of considerable commercial value.

Claflin, Horace Brigham, American merchant: b. Milford, Mass., 18 Dec. 1811; d. Fordham, N. Y., 14 Nov. 1885. He received a common school education, worked in his father's store until he was of age, when he went to Worcester, Mass., and in partnership with his brother-in-law, engaged in the dry goods business on a large scale. In 1843 he established in New York the firm of Bulkley & Claflin, importers and jobbers of dry goods; in 1851 it became Claflin, Mellin & Company, and in 1864 H. B. Claflin & Company, by which it is best known. Mr. Claflin conducted an enormous business extending all over the country, and since 1864 it has been the largest mercantile business in the United States, its sales in a single year having reached $72,000,000. Its financial strength, and the money markets' firm confidence in Mr. Claflin's methods and integrity, enabled the firm to pass safely through most of the financial crises of the last 40 years. In 1861 and in 1873 it had to ask for slight extensions of time in which to settle accounts, but all were paid with interest before maturity. Mr. Claflin was a man of domestic tastes, fond of books and horses, a regular attendant of Plymouth Church, Brooklyn, and an intimate friend of his pastor, Henry Ward Beecher.

Claflin, Mary Bucklin, American prose writer: b. Hopkinton, Mass., July 1825; d. Whitinsville, Mass., 13 June 1896. She was the second wife of William Claflin (q.v.). For 18 years she was a trustee of Boston University; and of Wellesley College from its foundation till her death. Among her publications are: 'Brampton Sketches'; 'Recollections of Whittier'; and 'Under the Elms.'

Claflin, William, American governor: b. Milford, Mass., 6 March 1818. He was educated in the public schools and at Brown University. For many years he was engaged in

the shoe and leather business in St. Louis, Mo., but later settled in Boston, Mass. He was elected to the State House of Representatives 1849–52; to the Senate 1860 and 1861; was a member of the Republican National Committee 1864–75; lieutenant-governor of Massachusetts 1866–9; and governor 1870–2. From 1877 to 1881 he was a Republican member of Congress. The degree of LL.D. was conferred on him by Harvard and Wesleyan universities.

Claflin University, a co-educational institution in Orangeburg, S. C.; organized in 1869, under the auspices of the Methodist Episcopal Church, exclusively for the colored race. Professors and instructors, 31; students, 713; volumes in the library, 5,600; grounds and buildings valued at $150,000; income, $14,000; president, L. M. Dunton, A.M., D.D.

Claghorn, Kate Holladay, American writer: b. Aurora, Ill., 12 Dec. 1863. She was educated at Bryn Mawr College, and has been engaged in research work for the United States Industrial Commission. Besides contributions to periodicals, she has published 'College Training for Women' (1897).

Claiborne, klā'bôrn, or **Clayborne, William,** American colonial adventurer: b. Westmoreland, England, about 1589; d. about 1676. He was of good family and became surveyor of the Virginia plantations for the London Company in 1621; settled at James City, and acquired 45,000 acres of land. In 1625 he was commissioned by Charles I. a member of the colony's council, and its secretary of state. In 1628–31 he received commissions, and in 1631 a royal patent, for discoveries and trade with the Indians; and about 1631 discovered and partially planted Kent Island in Chesapeake Bay, which settlement was accorded a burgess in the Virginia Assembly. In 1632 Lord Baltimore was given his Maryland charter, saving the rights of previous settlement; and his first colony arrived in March 1634. Finding Claiborne's island within his limits, he at once claimed title to and sovereignty over it, alleging that Claiborne's patent was only a trading right, giving neither title to soil nor political rights. Claiborne, however, claimed both ownership and independence, in which Virginia sustained him. He was at this time carrying on an extensive Indian trade in partnership with a London house in armed vessels, and he endeavored to prejudice the Indians against the new colony. Capt. Cornwallis of the latter retaliated in 1635 by assailing and capturing one of his vessels, in a fight in which several lives were lost. This misfortune, and the burning of his warehouse, aroused the suspicions of his partners, who sent out an investigating agent, to whom he turned over the Kent Island property and went to England. There he was sued for account, and indicted for rebellion; but this seems not to have been pressed. Meantime the agent seized all Claiborne's Virginia property, and acknowledged Baltimore's title and sovereignty in Kent Island. Claiborne then bought Palmer's Island at the head of Chesapeake Bay, supposing it beyond Baltimore's grant, and asked the king for an injunction to restrain Baltimore from interfering with him, and for a grant of lands along the Susquehanna. The king referred it to the commissioners of plantations, who ignored the purchase, refused the grant, and sent him to the courts for the injunction. Claiborne's party in Kent Island continuing insubordinate, Gov. Calvert reduced it and seized Palmer's Island also. Ousted from all his settlements, Claiborne petitioned for a grant of some island he might discover *within* the company's patent. This, too, was refused, but Charles made him treasurer of Virginia for life. He at once became a leading political director. During the English civil war that followed, Virginia clung to the royal cause, while Baltimore trimmed sail, and in 1644 Claiborne attempted to raise Kent Island against the proprietary government, as Roman Catholics and hostile to the king. He failed, but in 1645 an English captain, professing a parliamentary commission, overturned the Baltimore government altogether for a time. On the execution of Charles I., Virginia and Maryland, through its royalist deputy, proclaimed Charles II. Claiborne now joined the party of Parliament and was accordingly commissioned to reduce Virginia and Maryland to obedience. In 1652, accordingly, his expedition deposed Gov. Berkeley of Virginia, appointed a new governor, with Claiborne secretary of State, and forced Gov. Stone of Maryland to swear allegiance to Parliament. When Parliament was turned out by Cromwell, Stone repudiated the oath, whereupon Claiborne marched on Maryland with an armed force, deposed Stone, and appointed a Puritan administration, which at once disfranchised all the Roman Catholics. Cromwell intervened in their favor in 1654, and Stone undertook to recover his position by force, but was defeated and captured. Claiborne held his advantage till 1658, when Baltimore had his province restored to him. On the Restoration, in 1660, Claiborne was dismissed from the council and secretaryship of State. In 1675, on Cecilius Calvert's death, he petitioned the king for redress of his wrongs from the Baltimores, but no attention was paid to his request. His descendants in the South numbered many able and distinguished men, and are commemorated in town and county nomenclature. He was a man of enormous energy, resource, and pertinacity, a true type of the English adventurers who have overrun the world; but too inconsiderate and personal in policy for the largest success.

Claiborne, William Charles Cole, American senator: b. Sussex County, Va., 1775; d. New Orleans, La., 23 Nov. 1817. He received a good education, studied law, and engaged in its practice in Nashville, Tenn. He assisted in forming the constitution of Tennessee, and represented that State in Congress 1797–1801. In 1801 he was appointed governor of Mississippi Territory, and in 1804 of Louisiana. When the latter became a State and adopted its constitution, he was elected governor 1812–16. He was later elected United States senator, but died before taking his seat in that body.

Claiborne Stage, in American geology, the rocks, principally shales and limestones laid down in Middle Eocene time along the Carolinas and the Gulf States and around an arm of the sea that reached northward to the present mouth of the Ohio River. See EOCENE SERIES; TERTIARY SYSTEM.

Claim, a challenge of ownership of a thing which is wrongfully withheld from the possession of the claimant. The assertion of

liability of some one, to the party making it, to do some service or pay a sum of money. The possession of a settler upon lands owned by a government which is not used for any particular purpose, and from which no benefit is derived. When a new section of country is opened up, the government gives to each settler a certain amount of land on condition that he will live there, and improve and cultivate the soil for a definite time. The land taken is called a claim, and the settler receives an absolute title to the property when the conditions have been complied with. The ground must be staked out so that the particular claim may be identified. Mining claims are of this nature. Generally it is required that they be staked out, that a description of the claim be filed, and that a certain amount of work be done within a specified time. These claims are considered personal property until the conditions are complied with, and are subject to sale and transfer, it being necessary for all but the original settler to be able to show how and through whom he acquired title, in order to get a complete and absolute title from the government, as it is necessary to show that the land has been used, and in what manner, for a definite length of time, before the settler acquires his title from the government.

There are claims for labor and wages by mechanics for work done, by material-men for material furnished, or by pilots for pilotage. When filed of record these claims become liens against the property which has been benefited by the work, material, or care bestowed upon it.

Claims, when filed in the name of a municipal corporation for improvements, such as opening or widening a street, laying sewers, or any municipal improvement, are liens against the property benefited.

Claims, Court of. See COURTS.

Clairac, klā-răk, France, a town in department Lot-et-Garonne, on the Lot. It was the first town in the south of France to declare in favor of the Reformation. Pop. 2,388.

Clairaut, klā-rō, **Alexis Claude,** klōd, French mathematician: b. Paris 7 May 1713; d. there 17 May 1765. In his 11th year he composed a treatise on the four curves of the third order, which, with his subsequent 'Researches on Curves of Double Curvature' (1731), procured him a seat in the Academy at the age of 18. He accompanied Maupertuis to Lapland, to assist in measuring an arc of the meridian, and obtained the materials for his work 'On the Shape of the Earth.' In 1752 he published his 'Theory of the Moon,' and in 1759 calculated the perihelion of Halley's comet. A brother, who died at the age of 12, published in his ninth year a treatise entitled 'Divers Quadratures of Circular Elliptics.'

Clairin, George Jules Victor, zhŏrzh zhül vēk-tōr klā-răń, French portrait painter: b. Paris 11 Sept. 1843. He studied in Paris under Picot and Pils, and obtained a second class medal at the Paris Exposition in 1889, and the Legion of Honor medal in 1888. Beside portraits he has painted several brilliant scenes from Spanish history.

Clairvaux, klār-vō' (*clara vallis,* lightsome vale), a village of France on the river Aube, 10 miles southeast of Bar Sur-Aube, noted as the site of the celebrated abbey of Cistercian monks, founded in 1115 by Saint Bernard, who was its abbot till his death in 1153. It was a vast establishment, comprising within its enclosure a large population both of monks professed, lay brothers, laborers and artisans employed in various industries. There was a large and magnificent church; four cloisters surrounded by buildings for housing the monks, *conversi* or lay brothers, the novices and the superannuated members of the order; the abbots' hall with the guest house adjoining it, the kitchen, refectory, infirmary, scriptorium, etc.; all these were grouped in one portion of the monastic domain. In another portion were the fish tanks, the wine press, slaughter house, barns and stables, sawmill, grist-mill, oil-mill, tannery, tile works, etc., producing all necessary supplies for the use of the inmates. At the Revolution the monks were turned out, and the lands and buildings, except the church which was destroyed by fire, were occupied for public uses: the buildings are now used as a penitentiary and workhouse.

Clairville, Louis François, loo-ē frăń-swā klār-vēl, French writer of light comedy: b. Lyons 1811; d. 1879. He was the author of more than 220 comedies, farces, and comic-opera libretti. Among his most successful operettas are: 'Daphnis and Chloe' (1849); 'Mme. Angot's Daughter' (1873); among his vaudevilles: 'Property Is Robbery' (1848); 'Antoinette's Temptations' (1850); 'Cinderella' (1866).

Clairvoy'ance, defined as the power of perceiving without the use of the organ of vision or under conditions in which the organ of vision with its natural powers alone would be useless. It comprises the sight of things past, present, or future. Various methods of clairvoyance are recounted; by direct vision of things at a distance (opaque substances being no hindrance); by looking into a black surface; by looking into water, into a crystal, etc.; or by laying the object to be described on the forehead or chest of the clairvoyant; but clairvoyants now usually represent the cerebral region as the seat of illumination. From remote antiquity the possession of such powers by favored individuals has been believed. In the Old Testament (2 Kings vi. 15–17) is an account of the opening of the inner vision in the case of the servant of Elisha in answer to the prayer of the prophet.

Clairvoyant powers were claimed for the Pythia at Delphi. Apollonius of Tyana and Diodorus Siculus testify to the clairvoyance of the Indian sages. Macrobius gives an instance of clairvoyance on the part of the oracle of the Heliopolitan god when consulted by the Emperor Trajan. Tertullian speaks of a seeress who could prophesy and prescribe for the sick. Clairvoyance was known among the nations of antiquity, and is still generally accepted as an undoubted fact among Eastern nations. As instances of clairvoyants in later times may be mentioned Jacob Böhme (1575–1624) and Emanuel Swedenborg (1688–1772), the Swedish scientist and founder of the religious body called "The Church of the New Jerusalem."

The phenomena of clairvoyance have been carefully observed. The clairvoyant state seems to be intimately connected with the mesmeric, the somnambulistic, and the so-called "biological." Mesmeric somnambulism and clairvoyance were first brought to notice by Puysegur in 1784. The clairvoyant is usually in a state of trance, which may be induced by mesmeric

passes. In this state he is sometimes conscious only of his mesmerizer; in others, his clairvoyance is unrestricted; but the clairvoyant may enter the trance state spontaneously, or he may even be in possession of his ordinary faculties, both of which characteristics are to be found in Zschokke, the German novelist. In "second-sight," as found in Denmark, parts of Germany, and especially in the Highlands of Scotland, the seer is not in a state of trance similar to that in other forms of clairvoyance. Some modern scientists claim that the discovery of the X-rays, by Röntgen, in 1895, has solved a number of the questions raised by clairvoyance.

Clam. While the vernacular name clam is indiscriminately applied to any large edible bivalve, it is generally given to the northern "long" or soft-shelled clam (*Mya arenaria*), in distinction from the round clam, hard-shell clam, or quahog (*Venus mercenaria*), which extends from Cape Cod southward, though occasionally found as far north as the Maine coast (Casco Bay) and the Gulf of St. Lawrence at Shediac.

The long or soft-shelled clam occurs throughout the north Atlantic coast from New York to Greenland, and on the British shores, and is everywhere on the American coast a valuable article of food. The so-called black "head" is the siphon, which is very extensible and divided by a fleshy partition into two passages, opening out by two orifices surrounded by a circle of delicate sensitive tentacles; into the lower opening passes the sea-water, carrying minute animals, young and old, and diatoms, around to the mouth, which is in the larger end of the body; through the other or upper opening of the siphon the excrementitious matter is expelled. The clam has a tongue-shaped "foot," by which it burrows into the mud or sand to a depth of several inches.

The clam may be of either sex, male or female; it is very prolific, extruding an inconceivable number of eggs into the sea, where they are fertilized. The young larvæ (veligers) swim at the surface, where they are borne in all directions, until in a few days, the shells becoming heavier, they sink to the bottom, and, resting on the seaweed or stones at the bottom, the "spat" become attached by a few byssus threads. Clams begin to spawn by the end of the first year of their life, and in Narragansett Bay are sexually mature and the eggs become ripe when the animal is only an inch long. The breeding season begins in May, reaches it height in June, ending in July. Of course clams cannot feed when the tide is out, hence they grow more slowly when living near high-tide line. When the young begin to burrow, and they dig very rapidly during the first two months of their life, when one quarter to one half inch in length, they are attacked by crabs, eels, and starfish (q.v.). In Rhode Island attempts at restocking clam beds and raising clams artificially have met with success and promise valuable results in clam-culture. Clams have been taken five and three quarters inches long, and weighing 15 ounces. Attempts have been made to plant the clam on the Pacific coast.

The round, or little-necked clam, or quahog, as it is called in New England, lives in the sand from Cape Cod to Texas, just below low-water mark, and abounds at the mouth of estuaries. The shell is heart-shaped, the valves very thick and heavy. This bivalve is fished by means of long rakes and tongs, or is dredged like oysters. It has a very large "foot," and plows through the sand, but does not burrow deeply.

The beach, surf, or hen clam is *Spisula* (formerly *Mactra*) *solidissima*. The large edible species of the southern coast is the painted clam (*Callista gigantea*). Several large Pacific coast bivalves are edible and known as clams, being species of Taper, Laxidomus, and Glycimens. Very unlike any edible clam is the "giant clam" (*Tridacna gigas*) of the coral reefs of the Pacific Ocean, whose shell often weighs upward of 400 pounds. Consult: Mead, '30–33d Annual Reports of the Commissioners of Inland Fisheries of Rhode Island.'

Clamecy, klä-mē-sē, France, a town in the department Nièvre, 38 miles northeast of Nevers, left bank Yonne, at the mouth of the Beuvron. It was formerly surrounded by enormous walls, and defended by a castle, which commanded the town and environs. One of its suburbs, situated on the opposite side of the Yonne, was the seat of a bishopric *in partibus*, known as the bishopric of Bethlehem, founded in 1180 for the bishop of that place, who had been expelled by the Saracens. Wood-rafts for the supply of Paris with fire-wood are made up here, and floated down the Yonne and Seine. The parish church, founded in 1497, is remarkable for its tower and for some fine sculptures. Clamecy carries on several industries, the chief being that of tanning. Pop. 4,800.

Clan, a tribe or number of families, bearing the same surname, claiming to be descended from the same ancestor and united under a chieftain representing that ancestor. The clan system is essentially the same as that existing among the Arabs, the Tartars, and tribes similarly situated. From ancient times the "clans" existed in Ireland. The system is said to have sprung up in Scotland about 1008, while Malcolm II. was reigning, but it may have been of greater antiquity. In 1747 the legal authority of the chiefs over their followers was abolished as a punishment for the part which the former had taken in the insurrection which ended in 1745 at Culloden. While the clans flourished they were divided into two, the clans of the borders and those of the highlands.

Clan-Na-Gael, klăn-na-gāl, Irish secret society, founded in the United States for the purpose of aiding in securing "Home Rule" for Ireland. The society has been charged with some grave crimes, said to have been perpetrated for the purpose of intimidating the British government; but so little is really known about the workings of the organization, nothing positive can be asserted.

Claosaurus, klā-ō-sôr'us, **Trachadon,** trăk'-a-dŏn, or **Trachodon,** a genus of duck-billed dinosaurs (see DINOSAURIA) of the Cretaceous Period. This dinosaur was bipedal, herbivorous, resembling the hadrosaurus (q.v.), but the bill was not so broad. Its remains are found in the Upper Cretaceous formations of North America. A mounted skeleton possessed by Yale University is 30 feet long and stands 14 feet high.

Clap, Roger, American pioneer: b. Salcomb, Devonshire, England, 6 April 1609; d. Boston, Mass., 2 Feb. 1691. He came to America in 1630, and with other colonists settled the present Dorchester, Mass. In the course of his life he held several military and civil offices, being captain of Castle William 1665–86, and representative in the general court 1652–6. His 'Memoirs,' written for the instruction and benefit of his children, were originally published by Rev. Thos. Prince (1731). Other editions are: 'Memoirs of Roger Clap; Relating Some of God's Remarkable Providences to Him in Bringing Him Into New England' (Boston 1807; Pittsfield 1824; and an edition with preface, etc., printed by the Dorchester Antiquarian and Historical Society, Boston 1844).

Clap, Thomas, American clergyman: b. Scituate, Mass., 26 June 1703; d. New Haven 7 Jan. 1767. He was settled as a minister at Windham, Conn., in 1727, and in 1739 was elected president of Yale College. He contributed much to improve that institution, and was the means of building a college edifice and chapel. He was a man of extensive erudition, gave great attention to mathematics and astronomy, and constructed the first orrery made in this country. He published a 'History of Yale College' (1766); 'Nature and Foundation of Moral Virtue and Obligation' (1765); 'Nature and Motion of Meteors' (1781); etc.; and had made collections for a history of Connecticut; but most of his manuscripts were plundered in the expedition against New Haven, under Gen. Tryon. He had a controversy with President Edwards respecting Whitefield, and opposed the latter, not so much upon religious grounds as from a misapprehension of Whitefield's designs.

Clapboard, klăp'bōrd, colloq. klăb'ôrd, a thin, narrow board commonly used for covering the sides of wooden buildings. Clapboards are usually of white pine, and are made much thinner on one edge than on the other, so that when nailed on to each other one can lap a little over the one next below it. This makes the covering of the building much tighter than if the boards were only set together one above the other, and keeps the rain from driving in. Clapboards are sawn out of solid logs, not by sawing them clear through, as in making common boards, but by sawing from the outside to the middle or heart of the log. They are thus made thicker on the outside than on the inside. They are afterward smoothed in a planing machine.

Clapham, klăp'ạm, a southwest suburb of London, lying a mile south of the Thames. Clapham Common is still an open common of 200 acres. Clapham Junction, in Battersea parish, is one of the busiest and most perplexing railway junctions in the world.

Clapham Sect, a name given by Sydney Smith to the Evangelical Party in the Church of England; the Rev. Henry Venn was the vicar of Clapham, and some of the most eminent Evangelicals — Zachary Macaulay, Wilberforce, and the Rev. W. Romaine — lived there. Thackeray's 'Newcomes' has made the phrase familiar to a later generation.

Clapnet, a ground net used by bird catchers, consisting of two equal parts about 12 yards long by 2½ wide, and each having a slight frame. They are placed about four yards apart, and are pulled over by a string so as to enclose any birds on the intervening space.

Clapp, Henry Austin, American dramatic critic: b. Dorchester, Mass., 17 July 1841. He has been for many years clerk of the supreme judicial court of Massachusetts, and a well-known dramatic critic on the Boston press. He has also lectured extensively on Shakespeare. He has published 'Reminiscences of a Dramatic Critic' (1902).

Clap'perton, Hugh, Scottish explorer: b. Annan, Dumfriesshire, Scotland, 1788; d. near Soccatoo, central Africa, 13 April 1827. He entered the merchant service, but was impressed into the navy, in which he became a lieutenant in 1816. He then went to Africa, where he remained till 1825, returning with valuable information, though the disputed question of the course of the Niger was left undecided. On his return to England Clapperton received the rank of captain, and immediately engaged in a second expedition, to start from the Bight of Benin. Leaving Badagry in December 1825, he penetrated to Katunga, within 30 miles of the Quorra or Niger, but was not permitted to visit it. At Soccatoo the Sultan Bello refused to allow him to proceed to Bornu, and detained him a long time in his capital. He was the first European who traversed the whole of central Africa from the Bight of Benin to the Mediterranean. See Landor, 'Records of Captain Clapperton's Last Expedition' (1830).

Claque, klăk, a body of paid applauders at a public performance, according to tradition, an invention of Nero's. At the present time the claque is a recognized feature of theatrical management in Paris, and although said to be employed in London and New York, the use of such artifices is not recognized as legitimate outside of the French capital.

Clare, Saint, or **Saint Clara,** Italian nun: b. Assisi 11 July 1194; d. 12 Aug. 1253. When very young she was attracted by the accounts of the work being done by Saint Francis (q.v.), a young man of her native place. At an early age she decided to give her life wholly to God and to work for him in poverty. She sought and received the advice of Saint Francis, and when only 18 years of age, gave up the world, and began to devote herself wholly to charity. Other pious young women soon joined her and in time a recognized religious order was founded. For some years they had no special rule, but in 1218 they adopted the rule of Saint Benedict. Later (1224) Saint Francis gave them a rule, mitigating the rigors of the fast, but recognizing holy poverty in the extreme. Two years after her death she was canonized by Alexander IV. The order which she founded is known throughout the world as "Poor Clares"; but several branches of the order have been established as "Order of Saint Clara," "Capuchin Poor Clares," and the name by which first known, "Order of Poor Ladies." Another and a correct title is "Second Order of Saint Francis." The differences in the branches are the rules of poverty. Saint Clare allowed none of her nuns nor herself to hold property individually nor as a body. She followed the practice of Jesus Christ. They did not own the houses in which they lived. Some of the branches, as a body, have corporate rights of

property. Saint Clare is known by the name, "Princess of Poverty."

Clare, Saint, Order of. See CLARE, SAINT.

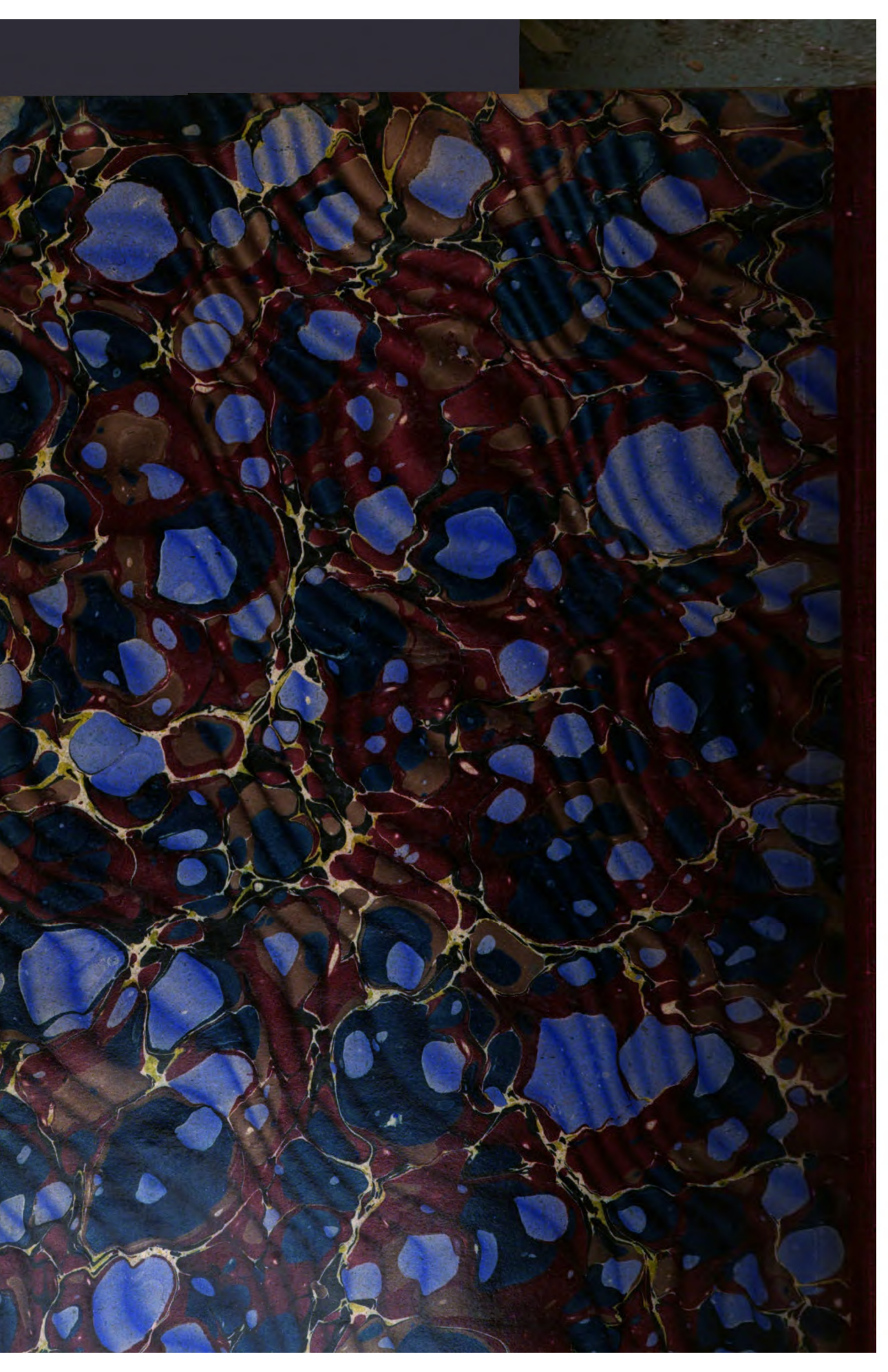
Clare, Israel Smith, American historical writer: b. Lancaster County, Pa., 24 Nov. 1847. He has published: 'Illustrated Universal History' (1876); 'Complete Historical Compendium' (1884); 'Library of Universal History' (1890); 'History of British Boer War' (1900).

Clare, John, English peasant poet: b. Helpstone, Northamptonshire, 13 July 1793; d. Northampton 20 May 1864. He led a rambling, unsteady life until 1818, when he was obliged to accept parish relief. In 1821 his 'Poems Descriptive of Rural Life and Scenery,' met with a favorable reception, and the issue of his 'Village Minstrel' later in the same year won him many friends. A subscription furnishing him with £45 annually was, however, dissipated by 1823, and his 'Shepherd's Calendar' (1827), which he hawked himself, was not a success. He brought out a new work, the 'Rural Muse,' in 1835, but became insane shortly afterward, and the remainder of his life, from 1837 to 1864, was passed in the Northampton Lunatic Asylum. Clare was a genuine poet, and his pictures of rural life are eminently truthful and pleasing.

Clare, Ireland, a county in the province of Munster; boundaries north and east, Galway Bay and county; east and south, the Shannon separating it from Tipperary, Limerick, and Kerry; west, the Atlantic. Area, 827,994 acres, nearly three fourths of which is under cultivation or in use as pasturage, and the remaining portion is in bog, mountain, or under water. The surface is irregular, rising in many places into mountains of considerable elevation, particularly in the east and west and northwest districts. The grazing lands are excellent; the chief minerals are limestone, lead, and slate, and in the southwest coal; but owing to the laws regarding mining, the mineral deposits remain almost undeveloped. The chief crops are oats and potatoes. Sheep and cattle on the hillsides, salmon in Clonderlaw Bay, the rivers Shannon and Fergus and at Dunbeg are sources of income. There are oyster beds near Ballyvaughan and along the shores of Burren. Frieze and hosiery are manufactured. The chief town is Ennis. Pop. (1901) 112,100.

Clare College, University of Cambridge, founded in 1326, and first called "University Hall." In 1336 its patronage was given, by Richard de Baden, then chancellor of the university, to Elizabeth de Burgh, sister of the Earl of Clare. Her object in giving of her riches to this college was to educate young men who would become priests, in order to replace the many clergymen who died from the plague. The college has not continued to educate men for the purpose intended by its first patron. Many noted men have been educated in this school. At first there were a master, eight senior, and seven junior fellows, besides scholars and students. Now the 15 fellowships are open to B.A.'s or persons of a higher degree, without restriction as to marriage. A fellowship becomes vacant in five years and 11 months from the time of election, unless the holder occupies at the same time the post of professor, public orator, etc., in the university, or the post of tutor, dean, bursar, or lecturer in the college. The master and fellows elect to the vacant fellowships, and the master is elected by the fellows. The foundation scholarships are eight of not less than £60, eight of not less than £40, eight of £20, four of £50 per annum each; three of about £60 per annum, tenable for three years, with preference to clergymen's sons; with several minor scholarships. At present there are 18 fellows, 24 residents, and two non-resident scholars, and several undergraduates.

Claremont, Cal., village in Los Angeles County, on the Atchison, T. & S. Fé R.R., 38 miles east of Los Angeles. This is the centre of a large fruit growing and raisin making region, and large crops of oranges and lemons are raised here. It is the seat of Pomona College, a Congregational institution, founded in 1888. Pop. (1902) 1,200.

Claremont, N. H., town in Sullivan County, on the Boston & Maine R.R., 50 miles north of Concord. Water power from Sugar River is furnished here to cotton and woolen mills, paper mills; and there are lumber, granite, and marble yards, shoe factories and brick yards. The Fiske Free Library, founded in 1873, is located here. Pop. (1890) 5,565; (1900) 5,498.

Clarence, George, DUKE OF, English prince: d. London, 18 Feb. 1478. He is chiefly celebrated for his tragical end, and for the use made of his name and history by Shakespeare. He was the son of Richard, Duke of York, and brother of Edward IV., king of England, and on his brother's accession to the crown in 1461 he was, as the reward of his assistance, created Duke of Clarence, and in 1462, lord-lieutenant of Ireland. When the Earl of Warwick deserted the cause of Edward, Clarence entered into alliance with him, married his daughter in 1469, retired with him to France, and afterward landed with him at Dartmouth in September 1470, and in a parliament held at Westminster by the Lancastrians had the crown settled on him, failing the issue of Henry VI. From a story told by Commines, it would appear likely, however, that Clarence had already meditated a double treachery before leaving France, and at Coventry, on 30 March 1471 he left the party he had espoused on the field of an imminent battle, and joined his brother Edward. Clarence's wife having died in 1476, he offered himself, on the death of Charles the Bold, to Mary, heiress of the estates of Burgundy, but the king opposed his suit, which hardly needed his opposition to cause it to miscarry. Some of his servants were about the same time hurriedly put to death on an accusation of magic. Clarence, who had for some time engaged in a rash opposition to the court, now appeared in the council to complain of the injustice of their sentence. For this interference with justice, he was committed to the Tower. A parliament was summoned, which condemned him to death; and on 18 Feb. 1478, he was found dead in the Tower. Of the manner of his death, or by whom it was perpetrated, nothing is known. Suspicion fell on his brother Richard, Duke of Gloucester, on account of their old enmity.